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EDITORIAL

Leptospirosis: an Emerging Concern in Rural Areas in Bangladesh

Professor Dr. Quazi Arif Ahmed

Leptospirosis is certainly an emerging health concern in rural areas of Bangladesh due to factors such as poor sanitation, frequent flooding and high levels of livestock and agricultural activity. The rural population is particularly vulnerable due to their reliance on water sources that are often exposed to contamination from animal urine, especially during monsoon and post-flood periods. Severe leptospirosis starts with fever, body ache, abdominal pain, eye congestion (if untreated), pancreatitis, acute hepatitis, meningitis and acute renal failure. Most commonly affected are fishermen, shrimp cultivation handler and live-stock handler.

Leptospirosis is an acute febrile illness caused by spirochetes of the genus Leptospira. This widespread zoonotic disease is increasingly being recognized in urban settings within developing countries [1, 2, 3]. Human infection results when water or soil contaminated with the urine of an infected animal comes in contact with human skin or mucous membranes [4]. The bacteria can survive in contaminated water or soil for weeks to months. Many different kinds of wild and domestic animals carry the bacteria, including: Livestock (cows, pigs, horses, sheep, goats, etc.), dogs, cats, rodents (rats, mice, etc.). In low-income urban neighborhoods, rats are important carrier mammals and excrete the organism in urine [5-7]. Conditions of poor sanitation, flash flooding, and overcrowding may facilitate transmission of the disease [8, 9]. The year-round persistence of wet conditions in low-lying areas and stagnation of standing water during the dry season may contribute to leptospirosis.

The alarming problem is that the affected person is not aware of the disease as it is propagated by water contamination by cattle urine. Lack of rapid test kit availability, pet contamination prevention, lacking in rodent control and lack of water clogging prevention contributes to silent spread of the disease. As no reliable, rapid, and readily-available diagnostic test exists, many cases go unrecognized [4, 9]. Serum polymerase chain reaction or blood culture can provide a definitive diagnosis [10], but are not widely available. Tests for the presence of genus-specific IgM, which develops within the first week of infection and persists for months [11], may be used for screening, and a microscopic agglutination test (MAT) can provide greater specificity along with some indication of the infecting serovar [12]. In Bangladesh, data on the epidemiology of leptospirosis are limited. One report documents leptospirosis in hospitalized patients during a dengue outbreak in 2000, when 18% of dengue-negative febrile patients at two Dhaka hospitals were positive for leptospirosis by PCR [13]. In a 1994 serosurvey in rural Bangladesh, a high prevalence of low-level MAT reactivity was identified among jaundiced febrile patients and among healthy controls [13].

Measures to be taken for leptospirosis prevention include avoidance of contact with water contaminated with cattle urine, wear

protective gears such as water proof boots, gloves and clothing while handling livestock, maintenance of good personal hygiene by washing hands & feet with soap and clean water after exposure to contaminated water and mud, improvement of drainage system infrastructure to reduce water clogging, control of rodent population by insecticides and other measures, proper disposal and management of animal waste to minimize contamination, raising awareness in communities about the risks of leptospirosis and preventive measures through campaigns, seminars, posters and leaflets, providing protective gears to people who are at risk, implementation of flood management plans for early warning and minimizing flood related health risk, assurance of availability of rapid test kits, necessary antibiotics and skilled personnel in endemic areas.

From July to November leptospirosis remains a major cause of fever with morbidities in Satkhira though it is less highlighted than malaria and dengue. Hence there is a necessity of government guidelines and screening kit availability. Also, social awareness and community education about safe handling of livestock and pets should arise. And, last but not the least, minimizing water pollution is very much important for leptospirosis prevention.

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Original Article

Effect of Therapeutic Exercises and Activities of Daily Living Instructions among PLID Patients in a Specialized Hospital: A Randomized Control Trial

***A.B.M. Zafar Sadeque[1], Md. Ahsanul Hoque[2], Fauzia Sobhan[3], S M Ismile Faruki Emon[4]**

Abstract

Introduction: Prolapsed lumbar intervertebral disc (PLID) is a major cause of low back pain (LBP). More often these patients take pain killers to reduce the pain. However, exercise and life style modifications can effectively reduce pains in these patients. **Methodology:** We did a randomized control trial (RCT) between the periods of January 2022 to June 2022 in the Department of Physical Medicine & Rehabilitation of Shaheed Sheikh Abu Naser Specialized Hospital, Khulna, Bangladesh. We enrolled 70 patients maintaining inclusion and exclusion criteria who were presented with back pain due to PLID in the age group of 20 to 55 years of both sexes. We divided the patients into 2 groups (group A with 35 patients who were advised therapeutic exercise and activities of daily living (ADL) instructions and group B with 35 patients without therapeutic exercise and ADL instructions). Pain reduction was assessed by Visual Analogue Scale (VAS) and Straight Leg Raising (SLR) test. **Results:** After receiving 6 weeks of therapeutic exercises and ADL instructions group A patients had significant pain reduction with mean VAS 1.03 compared to group B who had VAS 1.63 (*p* 0.009). SLR test also revealed significant pain reduction after receiving 6 weeks therapeutic exercises and ADL instructions (*p* 01007 and 0.019). **Conclusion:** Therapeutic exercises and activities of daily living instructions reduce pain among patients with PLID.

Keywords: Therapeutic Exercises, Activities of Daily Living (ADL) Instructions, Prolapsed Lumbar Intervertebral Disc (PLID).

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Background

Low back pain with or without sciatica is a major cause of morbidity throughout the world. The life time incidence is 50-70% and the incidence of sciatica may be as high as 40%. However clinically significant sciatica due to disc prolapse occurs in 4-6% of the population. The degeneration of intervertebral disc from a combination of factors can result in herniation, particularly at the L4-L5 and L5-S1 levels in more than 90% of the cases. The L3-L4 and L2-L3 accounts for the majority of remaining herniations. Neuro-imaging can differentiate herniated lumbar disc prolapse from other causes of low back pain and sciatica [1].

Defining LBP is difficult, but refers to a symptoms complex in which pain is localized to the lumbar spine or referred to the leg or foot [2].

Pain that radiates from the lower back down to one or other leg is known as sciatica. It is often exacerbated by exertion, coughing, sneezing, or straining. One of its most common causes is a 'slipped disc' which exerts pressure on one of the roots of the sciatic nerve [3].

Lumbar disc herniation is a pathological condition in which a tear in the outer, fibrous ring (annulus fibrosus) of an intervertebral disc allows the soft, central portion (nucleus pulposus) to be extruded (herniated) to the outside of the disc [4]. Displaced disc material can be initially classified as a bulge (disc material is displaced >50% of its circumference) or as a herniation (<50% of its circumference). Disc herniations can then be sub classified into protrusions or extrusions. A disc protrusion is defined as a herniation with the distance of the edges of the herniated material less than the distance of the edges at its base. A disc extrusion occurs when the distance of the edges of the herniated material is greater than the distance of the edges at its base. A disc extrusion can be further sub classified as sequestrated if the extruded disc material has no continuity with the disc of origin [5].

Acute disc prolapse may occur at any age, but is uncommon among very young and very old. Typically, while lifting or stooping, one feels severe back pain and is unable to straighten up. Either then or a day or two later pain is felt in the buttock and lower limb (sciatica) [6]. Diseases affecting the upper lumbar spine tend to refer pain to the lumbar region, groin or anterior thighs. The pain may worsen in postures that stretch the nerves and nerve roots. Sitting stretches the sciatic nerve (L5 and S1 roots) because the nerve passes posterior to the hip [7].

There are various options for treatment of chronic low back pain. Of them pharmacotherapy, thermotherapy & exercise therapy are commonly used. Exercise therapy remains one of the conservative mainstays of treatment for chronic low back pain and may be tailored to include aerobic exercise, muscle strengthening and stretching exercises [8]. Significant variations in regimen, intensity and frequency of prescribed programs present challenges to assessing efficacy of treatment among patients [9]. One meta-analysis of the current literatures exploring the role of exercise therapy in patient with varying duration of symptoms found a graded exercise program implemented within the occupational setting demonstrated some effectiveness in sub-acute low back pain. Among those suffering from chronic low back pain symptoms, small, but statistically significant improvements were observed regarding pain reduction and functional improvement [10].

Bangladesh is a poor country with huge population & very limited resources. So, it is quite difficult to manage such a huge number of PLID patients with our existing resources and management systems. As diagnostic approach and therapeutic options are diverse and often inconsistent, the management of PLID costs more recovery throughout the country. The present study was conducted to evaluate the effects of back muscle strengthening exercises on the patients of PLID to make the treatment easy & cost effective and to make disabled patients into working ones.

Methodology

We did a randomized control trial (RCT) between the periods of 1st of January 2022 to 30th June 2022 in the Department of Physical Medicine & Rehabilitation of Shaheed Sheikh Abu Naser Specialized Hospital, Khulna, Bangladesh. We enrolled 70 patients maintaining inclusion and exclusion criteria who were presented with back pain due to PLID in an age group of 20 to 55 years of both sexes. We divided the patients into 2 groups (group A with 35 patients who were advised therapeutic exercis-

es and activities of daily living (ADL) instructions and group B with 35 patients without therapeutic exercises and ADL instructions). Pain reduction was assessed by Visual Analogue Scale (VAS) and Straight Leg Raising (SLR) test.

Inclusion criteria

- Unilateral leg pain worse than low back pain
- Pain radiates beyond knee
- Paraesthesia in same distribution
- Nerve irritation signs (reduced straight leg raising that reproduces leg pain)
- Motor, sensory or reflex signs (limited to one nerve root).

Exclusion criteria

- Painful spinal deformity
- Severe/symmetrical spinal deformity
- Cauda equina syndrome
- Progressive neurological signs/muscle-wasting
- Multiple levels of root signs
- Previous spinal surgery, scoliosis, spinal cord disease, tuberculosis, tumor.

Patients were divided into two groups by simple random sampling by lottery. Equal numbers of patients were enrolled in both study group (Group A) and control group (Group B). Ethical clearance was taken from appropriate authority.

Interventions

Use of analgesics, therapeutic exercises and instruction of ADLs during treatment.

NSAID: Tab. Naproxen (500mg) twice daily after meal for pain relief with Cap. Omeprazole (20mg) coverage for first 3 days, then SOS.

Exercises: Back muscle strengthening exercises was demonstrated to every patient and was advised to do ten repetitions twice daily.

ADL instructions: ADL instructions was given to protect the Back from pain in all groups.

Data was collected using a preformed data collection sheet from all patients of group A and group B in a predesigned questionnaire from the first visit. Follow up data were collected from each patient in every 3 weeks interval from the first visit for up to 6 weeks. All data were compiled, screened and checked for any missing values and discrepancy. All omissions and inconsistencies were corrected and were removed methodically. Statistical analysis was done by SPSS. A p value <0.05 was considered significant.

Prior to the commencement of this study, the aims and objectives of the study along with its procedure, methods, risks and benefits of this study were explained to each respondent in easily understandable language and informed consent was taken. It was assured that all records would be kept confidential.

Results

A total number of 70 PLID patients were recruited for this study of which 35 patients were in study group (group A) and the rest 35 patients were in the control group (group B).

Discussion

A total number of 70 PLID patients were recruited for this study of which 35 patients were in study group (group A) who were treated with therapeutic exercises and ADL instructions and the rest 35 patients were in the control group (group B) who were treated without therapeutic exercises and ADL instructions.

The distribution of patients according to gender is recorded. In group A male was predominant than female which was 25 (71.4%) cases and 10 (28.6%) cases respectively. In group B male was also predominant than female which was 28 (80.0%) cases and 7 (20.0%) cases respectively. The difference between these two groups was not statistically significant ($p= 0.403$). It has been found that

Table I. Distribution of study population according to socio-demographic factors (n=70).

Socio-demographic Factors		Group A n (%)	Group B n (%)	Total n (%)
Occupation	House wife	10 (28.6)	7 (20)	17 (24.3)
	Service holder	5 (14.3)	5 (14.3)	10 (14.3)
	Businessman	5 (14.3)	6 (17.1)	11 (15.7)
	Farmer	10 (28.6)	11 (31.5)	21 (30)
	Day laborer	5 (14.2)	6 (17.1)	11 (15.7)
Socio-economic Status	Poor	21 (60)	24 (68.6)	45 (64.3)
	Middle class	13 (37.1)	9 (25.7)	22 (31.4)
	Rich	1 (2.9)	2 (5.7)	3 (4.3)

Table I shows distribution of patients by socio-economic condition. Most of the patients were from poor in both groups which were 21 (60%) cases and 24 (68.6%) cases in group A and group B respectively; this was followed by middle class which were 13 (37.1%) cases and 9 (25.7%) cases respectively. Only few patients were rich in both groups. In group A most of the patients were housewife (28.6%) and farmer (28.6%), followed by service holder (14.3%), businessman (14.3%) and day labourer (14.2%). In group B most of the patients were farmer (31.5%) followed by housewife (20.0%), businessman (17.1%), day labourer (17.1%) and service holder (14.3%).

Table II. Outcome of the patients according to Visual Analogue Scale after receiving therapeutic exercises (with t - test significance).

Study groups	N	Mean±SD	Median	Range	Significance*
Group A	35	7.20±0.9	7	6–9	t = 0.422
Group B	35	7.11±0.8	7	6–9	P = 0.675
Total	70	7.16±0.84	7	6–9	NS
Group A	35	2.94±1.11	3	1–5	t = 0.123
Group B	35	2.91±0.82	3	2–5	P = 0.903
Total	70	2.93±0.97	3	1–5	NS
Group A	35	1.03±0.92	1	0–3	t = 2.691
Group B	35	1.63±0.94	2	0–3	P = 0.009
Total	70	1.33±0.97	1	0–3	**HS**

* Independent samples t - test.

NS = Not Significant (P > 0.05); HS = Highly Significant (P < 0.01)

Table 2 shows outcome of patient assessed by visual analogue scale (VAS) after receiving therapeutic exercises. The mean score of VAS before treatment were 7.20 ± 0.90 and 7.11± 0.80 in group A and group B respectively (p=0.675). The mean score of VAS in 3 weeks after treatment were 2.94 ± 1.11 and 2.91 ± 0.82 in group A and group B respectively (p=0.903). The mean score of VAS in 6 weeks after treatment were 1.03 ± 0.92 and 1.63 ± 0.94 in group A and group B respectively. The difference of VAS between these two groups were statistically significant (p=0.009).

Table III. Outcome of the patients according to straight leg raising (SLR) test scores among the study groups (with t - test significance).

	Study groups	N	Mean±SD	Median	Range	Significance*
SLR–Right (Week 0)	Group A	35	69.57±18.76	70	30–90	t = 0.340
	Group B	35	68.00±18.76	70	25–90	P = 0.735
	Total	70	68.79±18.76	70	25–90	NS
SLR–Left (Week 0)	Group A	35	68.86±18.76	80	20–90	t = 0.349
	Group B	35	67.14±18.76	70	30–90	P = 0.728
	Total	70	68.00±18.76	70	20–90	NS
SLR–Right (Week 3)	Group A	35	80.57±18.76	85	100–270	t = 1.127
	Group B	35	77.43±18.76	75	110–150	P = 0.264
	Total	70	79.00±18.76	80	100–270	NS
SLR–Left (Week 3)	Group A	35	78.14±18.76	80	45–90	t = 0.322
	Group B	35	77.14±18.76	80	40–90	P = 0.748
	Total	70	77.64±18.76	80	40–90	NS
SLR–Right (Week 6)	Group A	35	86.57±18.76	90	75–90	t = 2.779
	Group B	35	81.71±18.76	80	60–90	P = 0.007
	Total	70	84.14±18.76	90	60–90	**HS**
SLR–Left (Week 6)	Group A	35	86.00±18.76	90	75–90	t = 2.408
	Group B	35	82.14±18.76	85	65–90	P = 0.019
	Total	70	84.07±18.76	85	65–90	**S**

* Independent samples t - test.

NS = Not Significant (P > 0.05); HS = Highly Significant (P < 0.01)

Table 3 shows outcome of patient assessed by Straight leg raising (SLR) test. The mean score of SLR test (right side) before treatment were 69.57 ± 18.76 and 68.00 ± 19.86 (p=0.735) in group A and group B respectively. The mean score of SLR test (left side) before treatment were 68.86 ± 21.83 and 67.14 ± 19.22 (p=0.728) in group A and group B respectively. The mean score of SLR test (right side) after treatment of 3 weeks were 80.57 ± 11.10 and 77.43 ± 12.21 (p=0.264). The mean score of SLR test (left side) after treatment of 3 weeks were 78.14 ± 13.34 and 77.14 ± 12.62 (p=0.748) in group A and group B respectively. The mean score of SLR test (right side) after treatment of 6 weeks were 86.57 ± 5.39 and 81.71. ± 8.82 (p=0.007) in group A and group B respectively. The mean score of SLR test (left side) after treatment of 6 weeks were 86.00 ± 5.12 and 82.14 ± 7.98 (p=0.019) in group A and group B respectively.

male is more commonly affected by PLID. This may be due to the heavy works done by them. Similar to the present result Akbar A (2002) have reported that male is predominant in PLID group [1]. Asghar Ali et al. (2013) also showed the similar result [4]. This may be because males are predominantly involved in laborious activities and strenuous exercises.

The distribution of patients according to occupation is recorded. In group A most of the patients were housewife (28.6%) and farmer (28.6%), followed by service holder (14.3%), businessman (14.3%) and day laborer (14.2%). In group B most of the patients were farmer (31.5%) followed by housewife (20.0%), businessman (17.1%), day laborer (17.1%) and service holder (14.3%). It has been found that housewives are most vulnerable in disc

prolapse in group A; however, farmers are more in group B. The disc prolapse is directly related with the occupation. The excess work load causes the PLID. Similar to this present study Kelsey et al. (1984) have reported that occupation is directly related with the PLID and also have added that the occupation which is related with weight lifting is more associated with PLID [11]. Similarly, Seidler et al. (2003) have published a report regarding the pattern of occupation and the occurrence of PLID which is consistent with the present study [12].

The outcome of patient assessed by visual analogue scale (VAS) was recorded. The mean score of VAS before treatment were 7.20±0.90 and 7.11±0.80 in group A and group B respectively (p=0.675). The mean score of VAS in 3 weeks after treatment were 2.94±1.11 and 2.91±0.82 in group A and group B respectively (p=0.903). The mean score of VAS in 6 weeks after treatment were 1.03±0.92 and 1.63±0.94 in group A and group B respectively (p=0.009). The improvement rate was better in group A than group B. The difference between two groups in improvement was statistically significant after 3 weeks and onward. Nilay S et al. (2011) study the decrease in VAS values pre- and post-treatment was statistically significant in both study groups (VAS: 95% CI = 4.685.15; 5.125.58, for BSG-CG, respectively) [13]. These results were statistically significant ($p < 0.01$). Global improvement and VAS pain scores were also better in patients who continued with exercise than in those who did not, but this difference was not statistically significant ($P>0.05$). Rahman MM et al. (2012) found that there is decrease in VAS score in patients treated with back muscle strengthening exercise which were statistically significant ($p < 0.001$) [14].

The outcome of patient assessed by straight leg raising test was recorded. The mean score of Straight leg raising test (right) before treatment were 69.57± 18.76 and 68.00±19.86 (p=0.735). In left side before treatment were 68.86± 21.83 and 67.14± 19.22 in group A and group B respectively (p=0.728). The mean score of Straight leg raising test (right) 3 weeks after treatment were 80.57± 11.10 and 77.43± 12.21 (p=0.264). In left side 3 weeks after treatment were 78.14± 13.34 and 77.14± 12.62 in group A and group B respectively (p=0.748). The mean score of straight leg raising test (right) 6 weeks after treatment were 86.57± 5.39 and 81.71± 8.82 (p=0.007). In left side 6 weeks after treatment were 86.00± 5.12 and 82.14± 7.98 in group A and group B respectively (p=0.019) in both groups trend of improvement was positive. The improvement rate was better in group A than group B. The difference between two groups regarding improvement was statistically significant after 6 weeks. In both groups trend of improvement was positive. The improvement rate was better in group A than group B. Amir Hosing et al. (2005) 90 have been reported similar result and have mentioned that back exercise with activity of daily living have decreased the pain intensity of PLID and improved SLR [15].

Conclusion

From the above study it could be concluded that, therapeutic exercises and activities of daily living reduce the pain in patients with PLID by reduction of VAS score and increment of straight leg raising test score.

Limitations

Although the results of this study support the hypothesis, there are some facts to be considered which might affect results.

- Because of time limitation and financial constraints, the study was conducted with small sample size. So, it may not be adequate to represent the whole population.
- Short time follow up.

• This is a single centered study.

Recommendations

• Further study is needed from primary to tertiary level hospitals in Bangladesh for better understanding to evaluate the efficacy of Therapeutic exercises in PLID patients.

• Therapeutic exercises and activities of daily living instructions should be given to the patients with PLID patients.

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Original Article

Evaluation of Performance of Exfoliative Cytology of Voided Urine in the Diagnosis of Urinary Bladder Mass

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Abstract

Background: Urinary Bladder cancer is the fourth most common neoplasm of men. Among the types of malignancy, an average of 90% to 95% of malignant bladder tumors are papillary urothelial carcinoma, not otherwise specified. Diagnosis is made based on the cystoscopy features, tumor biopsy, and urine cytology. Exfoliative cytology of urine is a harmless noninvasive investigative tool for the detection of urothelial tumors and for follow-up of treated bladder cancer patients. The purpose of the present study is to evaluate the performance of exfoliative cytology of vided urine in the diagnosis of urinary bladder mass. **Methods:** A total of 100 cases age ranging from 16 years to 110 years were included in this study which were clinically suggestive and cystoscopically and/ or sonographically suspected cases of bladder mass. For cytological examination, morning's 2nd voided urine was collected, processed, and directly smeared on albuminized glass slides. The slides were fixed in 95% ethyl alcohol and then stained with the Papanicolaou method and examined under a light microscope. Subsequently, Formalin-fixed paraffin-embedded (FFPE) tissue blocks were prepared from biopsy samples and stained with hematoxylin and eosin stain. Then examined under the light microscope. All data were recorded in a preformatted data sheet. Relevant data were analyzed for calculation of accuracy, sensitivity, specificity, positive predictive value, and negative predictive value. **Results:** In the present study, positive cytological diagnoses for malignancy were made in 73 (73%) cases and negative in 27 (27%) cases. Subsequently, histopathological diagnoses of 100 cases were correlated and found papillary urothelial carcinoma in 76 (76%) cases followed by adenocarcinoma, metastatic squamous cell carcinoma, leiomyosarcoma, and sarcoma botryoides 1 (1%) case in each. The rest of the cases were non-malignant inflammatory conditions. Regarding the grading of papillary urothelial carcinoma, 53 (53%) bladder tumors were of high grade and 23(23%) were of low grade. A 100% positive correlation was noted in the detection of high-grade papillary urothelial carcinoma, adenocarcinoma, metastatic squamous cell carcinoma, and leiomyosarcoma. Only one case of sarcoma botryoides could not be detected by urine cytology. Of 23 low-grade papillary urothelial carcinoma, 15 (65%) were cytologically positive for malignancy and 08 (35%) were cytologically negative. Among the total 80 cases of malignant tumors, 55 were invasive in nature. All the invasive tumors showed positive urine cytology except sarcoma botryoides. It was found that the sensitivity and specificity of exfoliative urine cytology in the diagnosis of urinary bladder tumor were 88.8% and 90.0% respectively for all tumors. The positive predictive value (PPV) of exfoliative urine cytology in predicting urinary bladder tumor among the test-positive subjects was 97.3% and the negative predictive value (NPV) among the test-negative subjects was 66.7%. The percentage of false negatives was 11.3% and false positives was 10%. The overall accuracy of the diagnosis of urinary bladder tumor by exfoliative urine cytology was 89%. **Conclusion:** Cytologic studies of voided urine are useful for diagnosing of urothelial tumors. In resource-poor settings like ours, urine cytology can be used as a simple non-invasive diagnostic tool for the detection of urinary bladder tumors.

Keywords: Urinary bladder mass, Urine cytology.

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Introduction

Urinary bladder cancer is the fourth most common neoplasm of men in North America [1]. It is also the 8th most common cancer in females in the United States of America (USA) [2]. The median age of diagnosis is 65 years [3]. The incidence of bladder cancer is gradually increasing [4]. Among the types of malignancy, an average of 90% to 95% of malignant bladder tumors are papillary urothelial carcinoma, not otherwise specified and the remaining 5% to 10% comprise mesenchymal neoplasms and epithelial tumors of other types including squamous cell carcinoma, sarcoma botryoides, leiomyosarcoma [5]. The common risk factors for bladder cancer include cigarette smoking, occupational exposure to polycyclic aromatic hydrocarbons, diesel smoke, aromatic amines, arsenic poisoning, abuse of phenacetin-containing analgesics, inflammation of the bladder, cyclophosphamide, radiotherapy for uterine cancer, and Schistosomiasis infection. Cigarette smoking is the main cause of bladder cancer and accounts for about 50% of cases in developed countries [6, 7]. Clinically, the most common presenting symptom of bladder cancer is painless hematuria which occurs in about 85% of patients. The rest of the common symptoms are irritative voiding symptoms like urinary frequency, urgency, and dysuria [8]. The most invasive and metastatic bladder cancers are not derived from papillary lesions but from flat carcinoma in situ and related lesions. Many carcinomas in situ do not form any cystoscopic visible abnormalities at all. Diagnosis is made based on the cystoscopy features, tumor biopsy, and urine cytology [9]. Though exfoliative cytology of urine is not routinely practiced in our settings, it is a harmless noninvasive investigative tool for the detection of urothelial tumors and for follow-up of treated bladder cancer patients [10]. A few studies showed that urine cytology can detect cancer not only before it progresses to invasive disease but also long before its cystoscopic and radiographic recognition [11-13]. The present is designated to evaluate the accuracy, sensitivity, specificity, positive predictive value, and negative predictive value of urine cytology in the diagnosis of urinary bladder mass. It is of particular interest to see how a simple test can be helpful as one of the powerful diagnostic tools in the detection and diagnosis of different malignant tumors of the urinary bladder.

Methods

This cross-sectional observational study was carried out in the Department of Pathology, Sir Salimullah Medical College and Hospital (SSMCH), Dhaka, Bangladesh from July 2007 to April 2009. A total of 100 patients with clinical symptoms (including hematuria and other irritative voiding symptoms) and sonologically detected bladder mass were included in this study. A second voided urine sample was collected from each patient to get exfoliated cells without bacterial contamination. Samples were taken to the laboratory within three hours. Then 50ml urine of each sample was centrifuged for five minutes. The supernatant was decanted and pellets were directly

smeared on albumenized glass slides. The slides were then fixed in 95% ethanol. Papanicolaou stain was done in next day and examined in the light microscope. The smears undergoing cytological examination were diagnosed into six categories- a) Negative (no abnormal cells), b) Reactive Urothelial Cell (reactive atypia), c) Atypia or Atypical cell (alteration of cell morphology but benign in nature), d) Suspicious (strongly suggestive of malignancy but insufficient for an outright diagnosis), e) Positive or malignant cell present, f) Unsatisfactory (cellular content is extremely low for assessment) [14]. The first three categories were combined into one group as cytologically negative and the suspicious and positive groups were combined into a second group named cytologically positive [14]. Subsequently, biopsy materials were collected from all the 100 cases. Among them, 98 cases were transurethral resection of bladder tumor (TURBT) and two were cystectomy specimens. Fixation, gross examination, tissue processing, and staining were done according to standard protocol followed by the pathology department of Pathology, SSMC, Dhaka. Microscopically following features were described- 1) histologic type, 2) histologic grade, 3) architecture of the lesion, 4) pattern of growth, 5) depth of invasion, 6) extent of the lesion, 7) lymphovascular or perineural invasion, and 8) additional pathology if present. All the necessary data were recorded methodically and meticulously in structured proforma. Statistical analysis was done in Microsoft Excel.

Results

The findings of exfoliative cytology of voided urine were correlated with the histopathological features. The age ranges from 16 years to 110 years. The mean age was 58.4± SD14.9 years. Out of 100 cases, the maximum number (49 cases; 49%) of patients belonged to the age group 51-70 years. The male-to-female ratio was 5:1 (approximately). So, the study points to male preponderance in urinary bladder mass. 55% of patients were from low socioeconomic status and 71% of patients were smokers.

Table I. Cytomorphological findings from voided urine in 100 cases.

Cytological diagnosis	Frequency n (%)
Negative for malignancy	17 (17)
Reactive	10 (10)
Atypical	00 (00)
Suspicious for malignancy	10 (10)
Positive for malignancy	63 (63)
Unsatisfactory	00 (00)
Total	**100 (100)**

At the time of the first consultation, 78 (78%) patients had hematuria. Along with hematuria, 63 (63%) had frequency and urgency. 22 (22%) patients had complained of urgency and dysuria without hematuria. The most commonly located urinary bladder masses were in the lateral wall which is about 53 (50%) cases, 19 (19%) were in the posterior wall, 15 (15%) were in the neck, 10 (10%) were in the trigone and 03 (3%) were in the anterior wall. For histopathology, 98% of the biopsy sample were transurethral resection of bladder tumor (TURBT) and the rest were cystectomy specimens. Muscularis propria was present in 60 (60%) biopsy samples. Cytomorphological findings of 100 cases showed, 63% was positive for malignancy; 10% of cases were reported as suspicious for malignancy (table I), and 27% of case was reported as negative. All suspicious diagnoses were included with the "positive" diagnoses because the patients were ultimately proven to have transitional cell carcinoma by histopathological examination (Figure 1). No cases had atypical cells in the smear or were unsatisfactory for reporting.

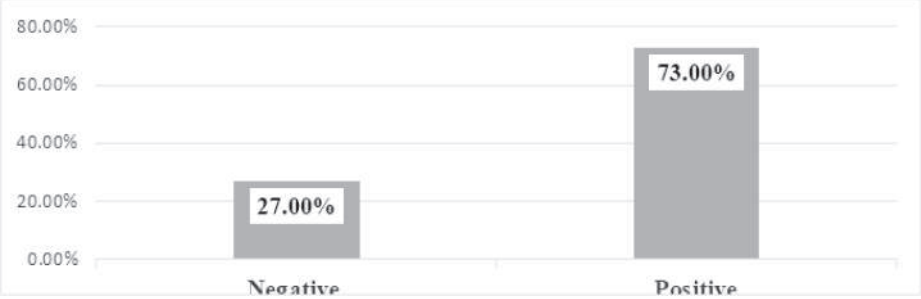

Figure 1: Cytomorphological findings from voided urine in 100 cases.

Based on histopathology, 76% of the case was diagnosed as papillary urothelial carcinoma followed by adenocarcinoma, metastatic squamous cell carcinoma, leiomyosarcoma, and sarcoma botryoides 1 (1%) case in each (figure 02). The rest of the cases were negative for malignancy. Among papillary urothelial carcinoma, 53 (53%) were of high grade.

Table II. Cyto-histopathological correlation.

Histological diagnoses	Frequency n (%)	Cytological diagnoses	
		Positive n (%)	Negative n (%)
Papillary urothelial carcinoma (low grade)	23 (23)	15 (65)	8 (35)
Papillary urothelial carcinoma (high grade)	53 (53)	53 (100)	0 (0)
Adenocarcinoma	1 (1)	1 (100)	0 (0)
Metastatic squamous cell carcinoma	1 (1)	1 (100)	0 (0)
Leiomyosarcoma	1 (1)	1 (100)	0 (0)
Sarcoma botryoides	1 (1)	0 (0)	1 (100)
Cystitis glandularis	7 (7)	0 (0)	7 (1)
Cystitis cystica	3 (3)	0 (0)	3 (100)
Polypoid cystitis	6 (6)	1 (20)	5 (80)
Follicular cystitis	2 (2)	0 (0)	2 (100)
Interstitial cystitis	2 (2)	1 (50)	1 (50)

Table III. Cyto-histopathological correlation of invasive malignant tumors.

Histological diagnoses	Frequency n (%)	Cytological diagnoses	
		Positive n (%)	Negative n (%)
Invasive papillary urothelial carcinoma	51 (92.8)		
Low grade	6 (10.9)	6 (100)	0 (0)
High grade	45 (81.9)	45 (100)	0 (0)
Invasive adenocarcinoma	1 (1.8)	1 (100)	0 (0)
Leiomyosarcoma	1 (1.8)	1 (100)	0 (0)
Sarcoma botryoides	1 (1.8)	0 (0)	1 (100)
Metastatic Squamous cell Carcinoma	1 (1.8)	1 (100)	0 (0)
Total	**55 (100)**	**54 (98.18)**	**1 (1.82)**

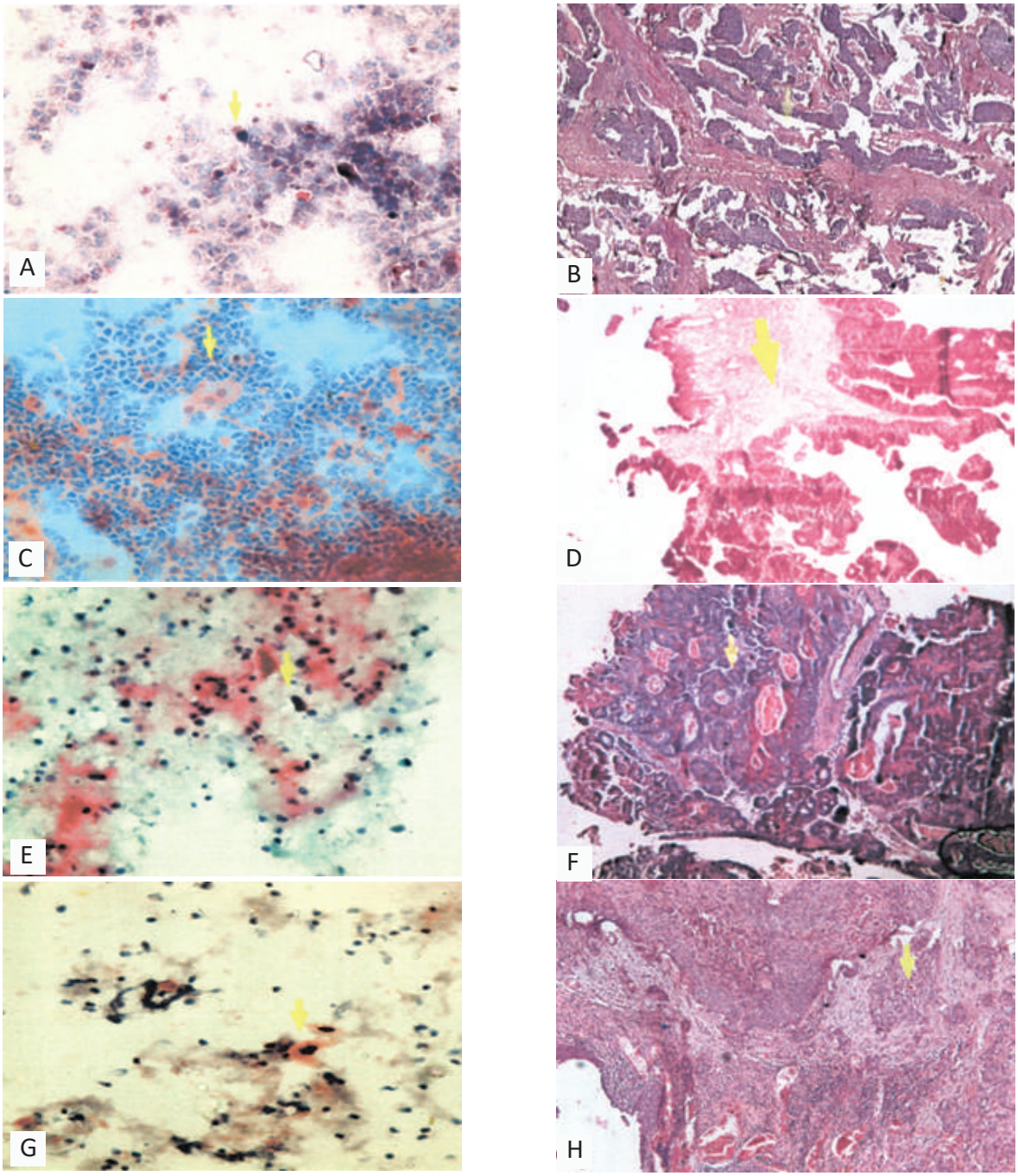

Figure 2: Photomicrographs (400X) of different variants of Urinary bladder cancer. A+B) Cytology of papillary urothelial carcinoma, high grade (A); histopathology sections of the same case in B. C+D) Clusters of normal urothelial cells in cytology (C), whereas histopathology of the same case showed papillary urothelial carcinoma, low grade (D). E+F) Adenocarcinoma in cytological smears and histopathological sections respectively. G+H) Squamous cell carcinoma in cytological smears and histopathological sections respectively. (Papanicolaou stain and Hematoxylin and Eosin stain (H & E) were used in cytopathology and histopathology respectively. Yellow arrows direct tumor cells.)

Table IV. Diagnostic performance of urine cytology to detect malignancy concerning histopathology .

Urine cytology	Malignant	Inflammatory condition	Total
Positive	71 (TP)	02 (FP)	73
Negative	09 (FN)	18 (TN)	27
Total	80	20	100

Out of 80 histologically diagnosed malignant cases, 71 were diagnosed as positive for malignant cells and nine were negative for malignant cells by urine cytology (table II). In the present series, 55 (55%) malignant tumors were invasive. Except for one, all the invasive cases gave positive cytologic results. One case of sarcoma botryoides could not be detected by urine cytology (table III). Out of 20histologically diagnosed inflammatory conditions, two were diagnosed as positive for malignant cells and 18 were diagnosed as negative for malignant cells by urine cytology. This study showed that the sensitivity and specificity of exfoliative urine cytology in the diagnosis of urinary bladder tumor were 88.8% and 90.0% respectively. The positive prediction value (PPV) of exfoliative urine cytology in predicting urinary bladder tumors among the test-negative subjects was 97.3% and the negative predictive value (NPV) among the test-negative subjects was 66.7%. The percentage of false negatives was 11.3% in urine cytology. The percentage of false positives was 10%. The accuracy of the diagnosis of urinary bladder tumors by exfoliative urine cytology was 89%.

Discussion

The practical importance of urine cytology is, first to reduce the chance of biopsy sampling error and second, the detection of cancer in patients who refuse frequent cystoscopic procedures. Urine cytology before review cystoscopy may help in avoiding unnecessary intervention and reduce both cost and patient morbidity [15]. Since 50-70% of the patients with urothelial carcinoma particularly the superficial form usually experiences a recurrent tumor, it is important to have a non-invasive technique that can predict the likelihood of recurrence of bladder cancer [16]. Urinary cytology can detect the most aggressive neoplasm as well as carcinoma in situ [8]. In this study, clinically and/or ultrasonographically suspected 100 patients of urinary bladder mass were evaluated to observe the performance of the exfoliative cytology of voided urine based on histopathology. The age ranges from 16 years to 110 years with a mean±SD of 58.4±14.9 years. Maximum number (31 cases; 31%) of patients belonged to age group 61-70 years. The male-to-female ratio was 5:1 (approximately). Some studies reported that bladder cancer is more frequent in male patients above 60 years of age [17-19]. Regarding etiological factors, cigarette smoking has a clear influence which increases the risk of bladder cancer 3-7-fold, and it has been estimated that 50-80% of bladder cancers among men can be attributed to the use of cigarette smoking [4]. In this study, there were 71 (71%) smokers and 29 (29%) were non-smokers which is in concordance with that study. In a developing country like ours, though no specific cause is yet identified, environmental factors like the use of pesticides should be taken into consideration as a possible causative factor for bladder carcinogenesis. Hematuria was the commonest presenting symptom in this study and 78 (78%) patients presented with hematuria. Several previous studies also showed that 80% of bladder cancer patients presented with hematuria [20]. By cystoscopy, lateral wall involvement is the highest (53%) than other locations in the present study. A recent study on 1000 cases, reported that the lateral wall was the most common site for

bladder cancer [21]. In the present study, voided urine cytology was done individually for each patient. All suspicious cases were included with the "positive" diagnoses. Considering that diagnoses became positive in 73 (73%) cases and negative in 27 (27%) cases. Subsequently, all TURBT specimens and two cystectomy specimens underwent histopathology. Papillary urothelial carcinoma was found in 76 (76%) cases, followed by adenocarcinoma, and metastatic squamous cell carcinoma. leiomyosarcoma and sarcoma botryoides 1 (1%) in each case. Several recent studies showed that histopathologically more than 80% of bladder cancer was papillary urothelial carcinoma [22]. These findings were similar to this study. In the present study, out of 100 cases, 53 (53%) were of high-grade papillary urothelial carcinoma and 23 (23%) were of low-grade papillary urothelial carcinoma. In the rest 04 (04%) cases grading was not done because these were malignant tumors other than papillary urothelial carcinoma. The remaining 20 cases were inflammatory conditions of the urinary bladder. Among the papillary urothelial carcinomas of low-grade variety 15 (65%) cases were cytologically reported as positive for malignant cells and 08 (35%) were reported negative for malignant cells (Figure: 02). In contrast all the high-grade lesions were identified correctly by cytology in voided urine in the present study. Comparative study regarding cyto-histologic correlation in previous studies is in concordance with the present study [23]. The limitations of urine cytology in low-grade papillary urothelial carcinomas are due to individual cells shaded in voided urine may not be significant for the diagnosis of cancer. So, well-differentiated tumors are not readily detected cytologically but results improve with higher-grade [11]. So positive cytology presumably identifies patients with high-grade lesions. Consistent with previously published data, this study showed the highest diagnostic accuracy with high-grade tumors and the lowest with low-grade tumors. When correlation between histopathological and cytologic diagnoses was done, it was observed that invasive tumors of all grades gave more consistent positive cytologic results. Among the total 80 cases of malignant tumors (all types), 55 (55%) cases were invasive in nature. They invaded muscularis propria. Except for one, all the invasive cancers gave positive cytologic results in the present study. Only one case of sarcoma botryoides could not be detected by urine cytology. The sensitivity, specificity, and overall accuracy of exfoliative urine cytology in the diagnosis of urinary bladder tumors were high. These values are concordant with several previous studies [24]. Positive cytology correlates well with grade, stage, and prognosis of bladder tumors, so it can be used in the detection, diagnosis, and follow-up of the primary tumor and for recurrent tumors receiving therapy [25]. In the present study, there were 2 (10%) false positive cases. In those cases, where urine cytology shows high-grade malignant cells but histopathological diagnosis reveals an inflammatory condition, the conclusion will be that besides the inflammatory condition, there might be high-grade abnormality within the bladder not detected during cystoscopic removal. A tumor localized within a diverticulum or higher up the tract may escape detection during cystoscopy but urine cytology can give a meaningful diagnosis in such cases if the tumor is of high grade. The possibility should be kept in mind and a thorough search should be made to detect the lesions. Moreover, urine cytology has the advantage of sampling whole bladder mucosa. So, invasive diseases or flat malignant lesions can be diagnosed long before identification by ultra-sonogram or cystoscopy and thus help in increasing the survival rate of the patients.

Conclusion

Cytologic studies of voided urine are useful for the detection of urothelial tumors and for follow-up of treated bladder cancer patients. The main advantage of urine cytology is that it can detect the cancer before it progresses to invasive disease. In a developing country like Bangladesh where facilities for cystoscopy and other relevant investigations are not available practically in most rural institutions, urine cytology can prove to be a simple non-invasive valuable tool in the detection, diagnosis, and follow-up of patients with primary and recurrent urinary bladder tumors.

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Original Article

Hepatoprotective Effect of Alpha Tocopherol in Rats

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Abstract

Introduction: The liver is the largest exocrine gland in our body. It is the vital organ undertaking wide range of functions, such as detoxification, metabolism, storage of iron and vitamins. It is very much important to protect liver in spite of continuous hepatotoxicity. The present study has been carried out with the aim to investigate the hepatoprotective effect of alpha tocopherol in paracetamol induced acute toxicity in rat. **Materials and methods:** This study was conducted at the department of Pharmacology, Dhaka Medical College from July 2014 to June 2015. Seven rats were taken as control while 7 rats were given hepatotoxic dose of paracetamol and 7 were given hepatotoxic dose of paracetamol along with alpha tocopherol. Serum level of bilirubin, ALT and AST were compared to find out any hepatoprotective effect alpha tocopherol. **Results:** Serum bilirubin level were 0.55 ± 0.09 mg/dl, 3.31 ± 0.53 mg/dl and 0.92 ± 0.20 mg/dl in control group, pretreated paracetamol and pretreated paracetamol with alpha tocopherol group respectively, serum ALT were 18.51 ± 2.00 U/L, 76.74 ± 17.69 U/L and 24.59 ± 5.08 U/L in control group, pretreated paracetamol and pretreated paracetamol with alpha tocopherol group respectively and serum AST were 24.75 ± 3.27 U/L, 69.23 ± 15.18 U/L and 29.00±3.97 U/L in control group, pretreated paracetamol and pretreated paracetamol with alpha tocopherol group respectively which were statistically significant. **Conclusion:** Compiling all results of this study it can be concluded that alpha tocopherol have hepatoprotective activity. These results provide a rationale for the use of alpha tocopherol in the development of new herbal medicine, much needed for the treatment of various liver ailments.

Keywords: Alpha tocopherol

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Introduction

The liver is the largest exocrine gland in our body. It is the vital organ undertaking wide range of functions, such as detoxification, protein-fat-carbohydrate metabolism, storage of iron and vitamins. The liver also plays major role in decomposition of RBCs, hormone production, plasma protein synthesis, glycogen storage and synthesis of urea. The organ liver is inevitable for survival and one cannot live without it for long period [1]. Liver is the key organ for detoxification of toxic substance and disposition of endogenous substances [2]. It is continuously and widely exposed to toxins and chemotherapeutic agents that lead to impairment of its functions. All types of injuries to the liver (e.g. circulatory, traumatic, toxic or microbiological) lead to damage of hepatocytes which results in its malfunctioning [3]. Therefore, the disruption of the integrity of liver function leads to fatal cases or even irreversible organic death. In liver injury, it is supposed that the intervention of free radicals in normal metabolic process is responsible for the patho-

logical changes. Free radicals attack biomolecules and induce lipid peroxidation, enzyme inactivation, and finally cell necrosis [4].

Hepatotoxicity is a growing concern of today's modern society. The World Health Organization (WHO) estimates that 140 million people worldwide suffer from alcohol dependency [5]. The increasing incidence of alcoholism, cigarette smoking, abusing substance and other unhealthy lifestyle options, like eating fatty foods, have contributed to the morbidity and mortality due to liver disease [6]. More than 900 drugs have been implicated in causing liver injury. Chemicals often cause subclinical injury to the liver, which manifests only as abnormal liver enzyme tests. Drug-induced liver injury is responsible for 5% of all hospital admissions and 50% of all acute liver failures [7].

Paracetamol or acetaminophen, chemically named N-acetyl-p-aminophenol (APAP) is generally safe for use at recommended doses [8]. The initial symptoms of overdose are nausea, vomiting, diarrhea and abdominal pain. Acute overdoses of paracetamol can cause potentially fatal kidney, brain and liver damage and, in rare individuals, a normal dose can do the same [9]. In cases of paracetamol overdose, the sulfate and glucuronide pathways become saturated, and more paracetamol is shunted to the cytochrome P450 system to produce NAPQI. As a result, hepatocellular supplies of glutathione become depleted, as the demand for glutathione is higher than its regeneration [10]. NAPQI therefore remains in its toxic form in the liver and reacts with cellular membrane molecules, resulting in widespread hepatocyte damage and death, leading to acute hepatic necrosis [11].

Antioxidant vitamins are important elements in protecting many cellular damages, for example vitamin C and E which protect against oxidant-mediated inflammation and inflammatory tissue damage. Vitamin E protects against liver damage and prevents fibrosis and cirrhosis progression in metal overload states. Alpha-tocopherol, a form of vitamin E, is an important lipid-soluble antioxidant. It performs its functions as antioxidant in the glutathione peroxidase pathway [12] (Wefers and Sies, 1988). As an antioxidant, vitamin E acts as a peroxyl radical scavenger, preventing the propagation of free radicals in tissues, by reacting with them to form a tocopheryl radical, which will then be reduced by a hydrogen donor and thus return to its reduced state (Traber and Stevens, 2011) [13].

So, we have done an experiment in rats with the research question of whether there is any difference in hepatoprotective effect of alpha tocopherol in paracetamol induced acute toxicity in rat? Our aim was to find out the hepatoprotective effect of alpha tocopherol in animals.

Materials and Methods

This study was conducted at the department of Pharmacology, Dhaka Medical College from July 2014 to June 2015. Seven rats were taken as control while 7 rats were given hepatotoxic dose of paracetamol and 7 were given both paracetamol and alpha tocopherol. Serum level of bilirubin, ALT and AST were compared to find out any hepatoprotective effect of alpha.

The experiment was carried out on 21 Long Evan Norwegian rats of either sex weighing between 150-200 grams which were collected from icddr,b, Dhaka. The rats were kept in animal house of the Department of Pharmacology, Dhaka Medical College. Rats of different batches of different groups were kept in different metallic cages. Male and female rats were also kept in different metallic cages and were allowed to feed on standard laboratory diet and to drink ad libitum. These rats were acclimatized five days at room temperature and humidity.

The rats were grouped in

Group A: This group consisted of 7 rats, were served as control. They received normal pelleted diet with water adlibitum for 15 days. On the 16th day 2cc of distilled water was feed orally to each rat through nasogastric tube.

Group B: This group consisted of 7 rats, were fed on normal diet with water adlibitum for 15

days. On the 16th day all the rats were treated with powdered Paracetamol orally at the dose of 2gm/kg body weight dissolved in 2cc distilled water.

Group C: This group consisted of 7 rats, received normal diet with adlibitum along with alpha tocopherol at a dose of 250 mg/kg body weight for 15 days. Then on the 16th day, all the rats were treated with powdered paracetamol orally at a dose of 2 gm/kg body weight dissolved in 2cc distilled water.

At the end of the scheduled treatment and after overnight fasting on the 18th day, blood sample was collected from all groups of rat by cardiac puncture and was collected in plain test tube for estimation of serum bilirubin, serum alanine aminotransferase (ALT) and serum aspartate aminotransferase (AST).

Results

We have taken serum bilirubin, ALT and AST as marker of hepatotoxicity. We have compared these markers with control group (Group A), the group given toxic dose of paracetamol (Group B) and the group given alpha tocopherol (Group C).

The comparison of serum bilirubin, ALT and AST between group A and group B is shown in table 1 which shows significant hepatotoxic effect of paracetamol on rats. Table 2 shows the markers of hepatotoxicity is significantly normal after given toxic dose of paracetamol as well as alpha tocopherol.

Table 1: Comparison of serum bilirubin, ALT and AST between group A (control) and group B (pretreated paracetamol).

Variable	Group	Mean ± SD	*p* value*
Serum bilirubin (mg/dl)	A (Control)	0.55 ± 0.09	<0.001
	B (Paracetamol)	3.31 ± 0.53	
Serum ALT (IU/L)	A (Control)	18.51 ± 2.00	<0.001
	B (Paracetamol)	76.74 ± 17.69	
Serum AST (IU/L)	A (Control)	24.75 ± 3.27	<0.001
	B (Paracetamol)	69.23±15.18	

*Unpaired t-test was done

Table 2: Comparison of serum bilirubin, ALT and AST between group B (pretreated paracetamol) and group C (pretreated paracetamol + pretreated α-tocopherol).

Variable	Group	Mean ± SD	*p* value*
Serum bilirubin (mg/dl)	B (Paracetamol)	3.31 ± 0.53	<0.001
	C (Pretreated α-tocopherol)	0.92 ± 0.20	
Serum ALT (IU/L)	B (Paracetamol)	76.74 ± 17.69	<0.001
	C (Pretreated α-tocopherol)	24.59 ± 5.08	
Serum AST (IU/L)	B (Paracetamol)	69.23 ± 15.18	<0.001
	C (Pretreated α-tocopherol)	29.00 ± 3.97	

*Unpaired t-test was done

Discussion

In this study, hepatotoxicity was induced by single oral administration of paracetamol at the dose of 2gm/kg body weight. Hepatic damage was assessed by significant rise of serum bilirubin, ALT and AST, which were compared to that of the control group. The elevation of the enzyme levels was found by several studies [15, 16].

In the present study alpha tocopherol was used to compare the hepatoprotective activity with A. paniculata and N. sativa. It was used at a dose of 250 mg/kg body weight according to the review of Adikwu and Nelson et al [17].

IIn the present study, comparison of hepato-

protective effects of alpha tocopherol was evaluated by estimating the levels of serum bilirubin, ALT and AST. There was evidence of significant prevention in rise of the biochemical parameters pretreated with alpha tocopherol. Same observations were found by most of the studies reviewed so far [12, 14 and 17].

Comparing the biochemical findings in different groups of experimental animals, it is obvious that toxic effects in the liver produced by paracetamol can be prevented by pretreated alpha tocopherol.

Conclusion

Compiling all results of this study it can be concluded that alpha tocopherol have hepatoprotective activity. These results provide a rationale for the use of alpha tocopherol in the development of new herbal medicine, much needed for the treatment of various liver ailments.

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Original Article

Comparison between Modified Alvarado Score and Mean Platelet Volume as a Diagnostic Tool for Acute Appendicitis

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Abstract

Background: Acute appendicitis (AA) is a common surgical emergency. Accurate diagnosis and timely intervention reduce morbidity and mortality but diagnosis is still a great challenge. Modified Alvarado score (MAS) is helpful in minimizing unnecessary appendectomies and mean platelet volume (MPV) is a significant biomarker in the differential diagnosis of acute appendicitis but there is no study on comparison between modified Alvarado score and mean platelet volume as a diagnostic tool for acute appendicitis. **Objectives:** This study was conducted to investigate the diagnostic value of MPV in comparison with MAS for early diagnosis of acute appendicitis. **Methods:** 100 cases of clinically diagnosed acute appendicitis were taken in this study. MAS was calculated and MPV was estimated in all cases. Appendicectomy had done in all cases. Diagnosis has confirmed by histopathology. According to histopathology report cases are divided into two groups [Acute appendicitis (AA) 82 cases and Normal appendix (NA) 18 cases] then two groups were compared. Diagnostic value of MPV and MAS were analyzed using receiver operating characteristic (ROC) analysis and diagnostic value of MPV was compared with that of MAS. **Results:** Median MAS and median MPV values were found to be significantly higher in AA group (7, range: 6–8 vs. 4, range: 3–5; and 9.0 fL, range: 8.5–9.5 vs. 8.0 fL, range: 6.5–8.5) (P=0.005 and 0.001). There was no statistically significant difference regarding diagnostic value of MAS and MPV (P = 0.629). Sensitivity and specificity of MAS and MPV for recommended cut-off values were 82.9%, 77.8% and 79.3%, 61.1% respectively and combined sensitivity, specificity, positive predictive value and negative predictive value of MAS and MPV were 91.5%, 50.0%, 89.3% and 56.3%, respectively. **Conclusions:** The diagnostic value of MAS and MPV are same for AA but increased MPV may be used as a supportive parameter along with MAS for the diagnosis of AA.

Keywords: Modified Alvarado score. mean platelet volume, acute appendicitis.

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Introduction

AA is one of the most common causes of surgical emergency. Timely diagnosis is crucial. Diagnostic delay is associated with increased risk of perforation and consequently potential peritonitis, sepsis and death [1]. On the other hand, negative appendicectomy is associated with unnecessary risks and costs [2]. MAS consisting of clinical history, physical examination and some laboratory tests was used for diagnosis of acute appendicitis. Im¬aging modalities like ultrasonography and comput-er¬ized tomography, as well as diagnostic laparoscopy have been increasingly used for fast and accurate diagnosis [3]. Although advanced diagnostic tests and imaging modalities have

been developed, false diagnosis rate is still high (about 15-30% of cases) [4]. Therefore, easy, widely avail¬able, cheap, and time-saving new laboratory methods are needed.

Platelet count (PC) is a part of complete blood count (CBC) and one of the most commonly used laboratory tests. There are three CBC parameters related to platelets; plateletcrit (PCT), mean platelet volume (MPV) and plate¬let distribution width (PDW). MPV is a machine-calculated measurement of the average size of platelets found in blood and is included in blood tests as part of the CBC. MPV is the most well-known of these parameters and is a marker of platelet function and activation. It has been studied as an inflammatory marker in various diseases including AA. MPV is higher when there is destruction of platelets. This may be seen in inflammatory bowel disease, immune thrombocytopenic purpura, myeloproliferative diseases and Bernard-Soulier syndrome. It may also be related to pre-eclampsia, and recovery from, transient hypoplasia. Abnormally low MPV values correlate primarily with thrombocytopenia when it is due to impaired production as in aplastic anemia.

Tanrikulu et al. and Bilici et al demonstrated decreased MPV in AA in their studies but Narci et al. and Recep Aktimur et al. showed increased MPV in AA in their studies [5, 6].

Objectives

This study was conducted to investigate the diagnostic value of MPV and compare the diagnostic accuracy of MPV with that of MAS.

Materials and Methods

This prospective observational study was conducted in the Department of Surgery of Satkhira Medical College Hospital, Satkhira, Bangladesh for the period May 2024 to September 2024. Total 100 cases were studied in this study by purposive sampling as per inclusion criteria of patients with provisional diagnosis of AA who underwent appendicectomy and exclusion criteria of patients with appendicular mass or abscess, generalised peritonitis due to appendicular perforation, appendix malignancies, pregnant women, and patients younger than 15 years.

MAS was calculated and MPV was estimated in all patients. Then all the patients underwent appendicectomies. Per operative findings were recorded. The appendicectomy specimen was sent for histopathological examination. The histopathology report was considered as the final diagnosis. According to histopathological assessment of the specimens, two groups were designed: the patients who have histopathologically confirmed diagnosis of acute appendicitis (AA group), and those with histopathological diagnosis of normal appendix (NA group).

Statistical analysis

Nonparametric statistics were used to present data. Consequently, medians with 25th and the 75th percentiles were given for descriptive statistics. Continuous variables were compared using Independent Samples Median Test and categorical variables were compared using Related Samples McNemar Test for two groups. MAS and MPV were found to be statistically different between groups, and they were analysed for their diagnostic value in AA with using ROC analysis. Recommended cut-off values of the parameters were determined for optimum sensitivity and specificity ratios of the diagnostic tests. And positive and negative predictive value (PPV and NPV) were calculated using recommended cut-off values. P value <0.05 was considered statistically significant. Statistical analysis was performed with the IBM SPSS Statistics 23.

Results

A total of 100 patients who underwent open or laparoscopic appendicectomies with a pre-

diagnosis of AA were included the study. There were 82 (82%) patients in AA group and 18 (18%) patients in NA group. No difference was found between the two groups with respect to age and gender of demographic characteristics but the median MAS and the median MPV values were found to be significantly higher in AA group (Table I).

The cut-off values of MAS and MPV for the diagnosis of AA were determined using receiver operating characteristic (ROC) analysis. At each value, the sensitivity and specificity for each outcome under study were plotted. Recommended cut-off values of the parameters were determined for optimum sensitivity and specificity ratios of the diagnostic tests. The diagnostic value of the recommended cut-off values of MAS and MPV and area under the curve were presented in Table II. ROC curves of MAS and MPV were shown in Figure 1.

Table I. Demographic characteristics and MAS and MPV values of the groups (n = 100).

Demographic characteristics	AA group (n = 82)	NA group (n = 18)	*p* value
Age (years) median (range)	25 (19 – 34)	28 (25 – 34)	0.055
Gender			
Male n (%)	45 (55)	13 (72)	1.00
Female n (%)	37 (45)	5 (28)	
MAS median (range)	7 (6 – 8)	4 (3 – 5)	0.005*
MPV (fL) median (range)	9.0 (8.5 – 9.5)	8.0 (6.5 – 8.5)	0.001*

MAS : Modified Alvarado score, MPV : Mean platelet volume, AA : Acute appendicitis, NA : Normal appendix, n : Number of patients, range: The range between the 25th and the 75th percentiles, *: Significantly different from the control value, $p < 0.05$

Independent Samples Median Test was used to test the significance of difference of AA group with NA group (control) and the significance level was at $p < 0.05$.

Table 2. The diagnostic value of the recommended cut-off values of MAS and MPV in the diagnosis of AA and area under the curve.

Recommended cut-off value	Sensitivity (n = 82)	Specificity (n = 82)	AUC	95% CI	*p* value
MAS value = 6	82.9	77.8	0.882	0.799–0.965	< 0.05
MPV (fL) = 8.5	79.3	61.1	0.775	0.654–0.896	< 0.05

MAS : Modified Alvarado score, MPV : Mean platelet volume, AA : Acute appendicitis, AUC : Area under the curve, CI : Confidence interval.

Combined sensitivity, specificity, positivepredictive value and negative predictive value of MAS and MPV for recommended cut-off values were 91.5%, 50.0%, 89.3% and 56.3%, respectively.

A Related Samples McNemar Test was used for paired comparison between MAS and MPV. No significant difference was found between these two procedures (P value > 0.05). So, the two procedures (MAS & MPV) are same as a diagnostic tool for acute appendicitis.

Discussion

In spite of the common occurrence of the disease, advanced diagnostic tests, and imaging modalities, negative appendectomy rates are still high. Although, a lot of biomarkers or investigations have been suggested in the diagnosis of AA, most of them are expensive and

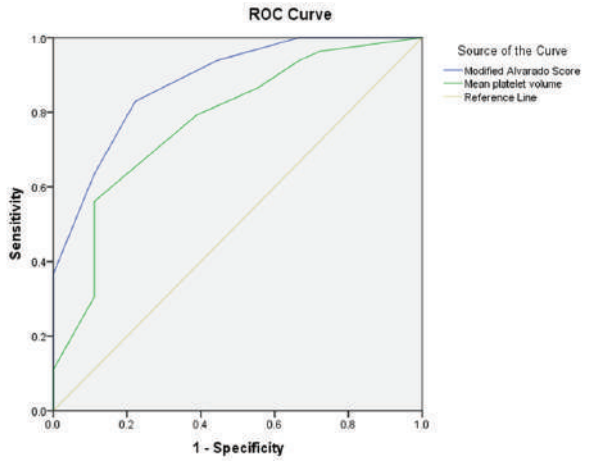

Figure I: Receiver operating characteristic (ROC) curves of Modified Alvarado scoreand mean platelet volume.

unavailable in most of the emergency departments. Therefore, as a cheap and commonly available diagnostic marker, inflammation-related CBC parameters and a clinical and laboratory-based scoring system MAS has been used. Detected value of MPV has been shown to be affected in many inflammatory disorders and it was shown that it could be used as a diagnostic marker for AA. Although MAS and MPV have been studied separately or with different combination but comparison between MAS and MPV has not yet been studied in the diagnosis of AA.

This study demonstrates a diagnostic value of MAS and MPV in the differential diagnosis of AA. The results of this study show that the two procedures (MAS & MPV) are same as a diagnostic tool for acute appendicitis. In AA group we found significantly higher MAS and MPV values. Platelet activation is reflected from the diseases which were prone to thrombosis and inflammation [5]. Previous studies have shown that, MPV values increases in cardio- and cerebrovascular disorders and low-grade inflammatory conditions which are prone to thrombosis [6]. On the contrary, in high-grade inflammatory diseases including rheumatoid arthritis (RA) and Crohn's disease (CD) lower MPV values are present. Tanrikulu et al. [5] demonstrated decreased MPV in AA patients. Albayrak et al. and Bilici et al [6] showed lower MPV values in AA patients with the comparison of healthy adults and pediatric individuals but our study shows increased MPV in AA patients. On the other hand, Uyanık et al. [7] reported no statistically significant difference in MPV between AA and control group of healthy children. They commented that this difference could have resulted from a possible statistical error, due to frequent occurrence of clinically occult inflammation in pediatric age group. Increased MPV in AA were reported in one study conducted by Narci et al [8]. They suggested that higher MPV values might guide the diagnosis of acute appendicitis, with 66% sensitivity and 51% specificity. And another study conducted by Recep Aktimur et al. [9]. They suggested that increased MPV values may be used as a valuable diagnostic tool of acute appendicitis, with 57.1% sensitivity and 60.7% specificity. In the present study, we have found higher MPV and MAS values in AA group, for recommended cut-off value of 8.5 fL, the sensitivity and the specificity for MPV were calculated as 79.3% and 61.1% and for recommended cut-off value of 6, the sensitivity and the specificity for MAS were calculated as 82.9% and 77.8%. Combined sensitivity and specificity of MAS and MPV for recommended cut-off values were 91.5% and 50.0%. Here combined sensitivity is high but specificity is low.

Conclusion

The results of this study, integrated with the understanding from the available literature indicates that MPV is increased in acute appendicitis. No difference was found between MPV and MAS in diagnosis of acute appendicitis. So, the diagnostic value of MAS and MPV are same but MPV may be used as a supportive parameter for the diagnosis of acute appendicitis.

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Original Article

Priming Technique of Rocuronium in Facilitating Intubation-A Study in Khulna Medical College Hospital, Khulna, Bangladesh

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Abstract

Introduction: Ability to intubate the trachea rapidly and safely is still very important, especially in emergency anesthesia where there is possibility of regurgitation and aspiration of gastric contents. For making intubation quick, easy and atraumatic, the role of short-acting depolarizing Neuromuscular blocking agents (NMBA) need to be justified in this situation. **Objective:** To assess the Priming Technique of Rocuronium in Facilitating Intubation. **Methods:** This prospective, randomized study was carried out in the Department of Anesthesiology and ICU, Khulna Medical College & Hospital, Khulna from January to December 2022. Total 75 patients admitted in Surgery, Gynae & Obs. and ENT departments of KMCH, undergoing elective surgery were selected for the study. After recruitment, patients were divided into three groups, 25 patients in each group (Group I- received thiopentone (5mg/kg) and Fentanyl following induction, Group II- received Suxamethonium and Group III- received rocuronium). Randomization was done by systematic sampling. **Results:** In priming group any unpleasant symptoms during priming like visual disturbance, feeling of dyspnea, difficulty in controlling tongue were closely observed. Intubating conditions were assessed using the intubation criteria of Cooper et al. The difference between the priming and the single dose rocuronium group was not statistically significant in terms of timing of intubation ($p = 0.329$). While evaluating intubating conditions, no significant difference was also observed between priming group (group-II) and single dose rocuronium group (group-III) in jaw relaxation ($p=0.698$), vocal cords movement ($p=0.646$) and response to intubation ($p=0.514$). Much earlier intubation was observed in Group I compared to the other two groups ($p = 0.039$) and in terms of intubating conditions. Smooth intubation was significantly higher in Suxamethonium group (Group-I). In terms of unpleasant effects of priming it was observed that 1.3% of the patients of priming group had visual disturbances, 4% dyspnoea, 1.3% difficulty in controlling tongue and 2.6% difficulty in swallowing during the priming interval and remaining 90.6% was free of any unwanted side effects. **Conclusion:** Using priming technique with standard intubating dose of rocuronium has no beneficial effects on reducing intubation time and providing better intubating conditions over single bolus injection of rocuronium. Therefore, Rocuronium in single bolus injection can replace Suxamethonium for quick endotracheal intubation in surgical procedures of short and medium duration.

Keywords: Priming Technique, Rocuronium, Facilitating Intubation.

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Introduction

Tracheal intubation is usually performed after induction of anesthesia followed by relaxation of skeletal muscle. The ability to intubate the trachea rapidly and safely is still paramount in all clinical situations. Suxamethonium is still the drug of choice for this purpose. This short-acting depolarizing NMBA (Neuromuscular blocking agents) is probably the most popular drug used for making intubation quick, easy and atraumatic. Among the factors influencing onset time is the rapidity with which neuromuscular blockers are delivered to the neuromuscular junction cleft [1]. Induction agents that maintain cardiac output and blood pressure may promote a faster delivery of the neuromuscular blocking agent to the site of action [2,3]. But this drug has many side effects like post-operative muscle pain, hyperkalemia, malignant hyperthermia, masseter rigidity etc. For these reasons, researchers have concentrated on developing an alternative drug to suxamethonium or an alternative method of using non-depolarizing NMBA for rapid sequence induction of intubation technique. In most of the patients, clinically acceptable intubating conditions are obtained within 60 to 90 seconds after a 0.6 mg/kg dose of rocuronium with a clinical duration of action of 30 to 40 minutes under balanced anaesthesia [1]. Based on onset of action, Magorian et al [2] suggested that 0.9 to 1.2 mg/kg rocuronium may be necessary as an alternative to suxamethonium, but this megadose correspondingly increases the clinical duration of action [3]. Clinical durations were shown to be 50 minutes following a 0.9 mg/kg dose and around 80 minutes following a 1.2 mg/kg dose of rocuronium [1, 2]. Priming technique with rocuronium has been investigated by several authors to reduce the onset time and to optimize its efficacy and reduce the incidence of side-effects Griffithetal [4, 5] Jaochim et.al. [6] used a priming dose of 0.06 mg/kg and after priming interval of 3 minutes, intubating dose of 0.54 mg/kg were administered to compare onset time and intubating conditions with the patients receiving rocuronium 0.6 mg/kg in bolus dose. In the present study, a priming dose of rocuronium 0.06 mg/kg and a priming interval of 3 minutes were chosen to compare the influence of priming technique on the onset time and intubating conditions with standard intubating dose (0.6 mg/ kg) and outcome was also compared with a control group receiving suxamethonium (1.5 mg/kg). Moreover, the side-effects associated with the use of suxamethonium like, post- operative muscle pain, hyperkalemia, malignant hyperthermia, masseter rigidity etc. were assessed here. Another aim of this study was to observe whether priming technique is associated with any unpleasant symptoms like, visual disturbance, feeling of dyspnea etc.

Materials & Methods

This prospective, randomized study was carried out in the department of Anaesthesiology and ICU, Khulna. Medical College Hospital, Khulna, Bangladesh from January to December 2022. Seventy five patients, aged between 17-45 years, ASA I & II, Mallampati class I & II admitted in Surgery, Gynae & Obs. and ENT departments of KMCH, undergoing elective surgery, requiring general anesthesia and endotracheal intubation were selected for the study. After recruitment, patients were divided into three groups, 25 patients in each group. Group-I patients (n=25) received Thiopentone (5mg/kg) and Fentanyl (2µgm/kg), followed by intubating dose of Suxamethonium (1.5mg/ kg). Group-II patients (n=25) received priming dose of Rocuronium (0.06mg/kg), 3 minutes later, anesthesia was induced with Thiopentone (5mg/kg) and Fentanyl (2µgm/kg), followed by intubating dose of Rocuronium (0.54mg/kg). Group-III patients (n=25) received Thiopentone (5mg/kg) and Fentanyl (2µgm/ kg), followed by intubating dose of

Rocuronium 0.6mg/kg in single dose. Intubating conditions were assessed using the criteria of Cooper et al. [4]. Statistical analysis (sample size, mean) were calculated for all quantitative variables of each group. TOF ratio (Train of four ratio) and hemodynamic variables were compared between the groups. Intubating conditions were also compared. Informed consent was taken individually from patient and ethical clearance was taken from the Ethical review committee of Khulna Medical College Hospital, Bangladesh.

Results

Table I. Demographic characteristics among the three groups (N=75).

Variable	Group-I (n=25)	Group-II (n=25)	Group-III (n=25)	*p* value
Age (yrs)	35.4±8.0	30.4±9.0	31.5±10.5	0.099
Weight (kg)	52.5±6.9	47.6±8.7	49.6±8.8	0.073
Sex	6/19	17/8	8/17	0.24

**p* values were calculated by using ANOVA.

Age and sex distribution of the study population is depicted in table I. The mean age of Group-I was higher (35.4±8.0 years) than that of Group-II (30.4±9.0 years) and Group-III (31.5±10.5 years). The weight and sex distribution of the subjects in three groups was almost homogenous.

Table II. Hemodynamic state 3 minutes after priming in Group-II (N=75).

Hemodynamic variables	Mean±SD
Heart rate (b/min)	81±9
Systolic BP (mmHg)	113.9±10.7
Diastolic BP (mmHg)	72.3±6.9
SpO_2 (%)	100±0
TOF ratio (%)	87±5.8

Table II shows the haemodynamic state 3 minutes after priming in Group-II. The mean heart rate was 81±9/minute, mean systolic blood pressure 113.9±10.7 mmHg, mean diastolic blood pressure 72.3±6.9 mmHg, mean SpO_2 100±00 (%) and mean TOF ratio 87±5.8 (%).

Table III. Comparison of timing of intubation among the groups (N=75).

Timing of intubation	Group-I (n=25) n (%)	Group-II (n=25) n (%)	Group-III (n=25) n (%)
30s	8 (32)	5 (20)	3 (12)
60s	17 (68)	16 (64)	14 (56)
90s	00 (00)	4 (16)	7 (28)
>90s	00 (00)	00 (00)	1 (4)

Table III shows timing at intubation shows that 32% of the patients of Group-1, 20% of Group-II and 12% of Group-III were successfully intubated at 30 sec following induction.

Table IV. Comparison of jaw relaxation among the three groups (N=75).

Jaw relaxation	Group-I (n=25) n (%)	Group-II (n=25) n (%)	Group-III (n=25) n (%)	*p* value
Minimum	00	00	1 (4)	
Moderate	10 (40)	10 (40)	11(44)	0.698
Good	15 (60)	15 (60)	13(52)	

**p* values were calculated by using ANOVA.

Table IV shows that 60% of the subjects of Group-I and Group-II and 52.0% of Group-III exhibited good relaxation of jaw relaxation at the time of intubation. The moderate relaxations were 40%, 40% and 44.0% in Group-I, Group-II and Group-III respectively.

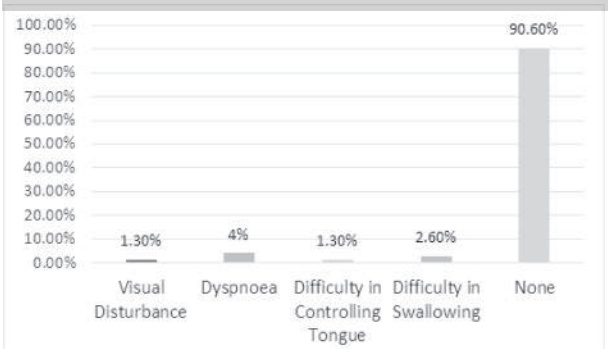

Figure 1: Side effects encountered by Group II patients 3 minutes after priming (N=75).

Figure 2: Comparison of state of vocal cords at intubation among the groups (N=75).

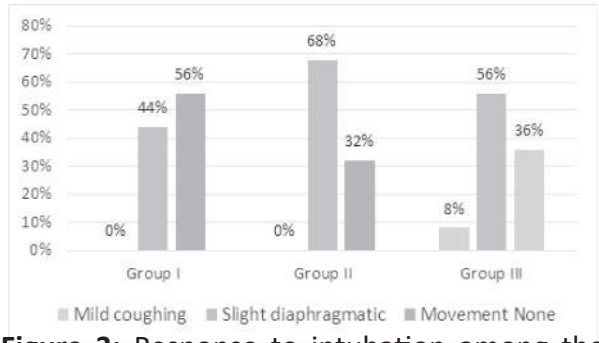

Figure 3: Response to intubation among the three groups (N-75).

Discussion

The priming principle' has been described by Foldes [7] consists of administering a small dose of non- depolarizing NMBA to facilitate rapid intubation after induction. Various techniques are used to reduce intubation time of non-depolarizing NMBA like 'priming principle'. While application of mega-dose of rocuronium may be suitable for rapid-sequence induction and intubation, but at the cost of

Table V. Comparison of intubation score among the three groups (N=75).

Intubation score	Group-I (n=25) n (%)	Group-II (n=25) n (%)	Group-III (n=25) n (%)	*p* value
0-2 (Poor)	00	00	00	
3-5 (Fair)	00	00	00	
6-7 (Good)	9 (36)	12 (48)	14 (56)	0.286
8-9 (Excellent)	16 (64)	13 (52)	11 (440)	
Mean±SD	7.8±1.2	7.6±1.2	7.2±1.6	

Table V shows that based on intubation score 64.0% of Group-I, 52.0% of Group-II and 44.0% of Group-III were categorized as having excellent outcome.

Table VI. Comparison of TOF ratio at different stages of intubation in Group I & III.

TOF ratio	Group-I (n=25) Mean±SD	Group-III (n=25) Mean±SD	*p* value
3 minutes after priming	87.0+ 5.8	Not done	
At intubation	57.4±8.4	54.5+7.8	0.644
Just after intubation	39.7±13.8	36.4 ±14.6	0.457

p values were calculated by using t test.

Table VI shows TOF ratio (train of four ratio) at different stages of intubation in Group I in contrast to Group III.

much longer duration of action [2]. Table-1 shows the distribution of demographic characteristics among the three groups. The mean age of Group-I was higher (35.4±8.0 years) than that of Group-11 (30.4±9.0 years) and Group-III (31.5±10.5 years) although the difference did not reach the level of significance (p = 0.099). The weight of the subjects in three groups was almost homogenous. The groups were also homogeneous in terms of sex distribution (p = 0.241). Yavascaoglu et al. [8] studied 75 adult patients (17-67 years) using different priming interval (two minutes) and priming doses (priming dose: rocuronium 0.06 or 0.1 mg/kg, intubating dose 0.54 or 0.5mg / kg). Hemodynamic state at intubation and just after intubation demonstrated that the hemodynamic variables were within physiological range and almost homogeneously distributed among the groups and no adverse outcome was noticed. All the hemodynamic variables were also stable at three minutes after priming in group-II (Table-2).

In the present study, timing at intubation showed that 32% of the patients of group-I, 20% and 12% of the patients of group-II and group-III respectively were successfully intubated at 30 second following induction. The rest of Group-1 (68%), 64% of Group II and 56% of Group-III were effectively intubated at 60 sec. The Suxamethonium group allowed much earlier intubation compared to the other two groups (p = 0.039). This result correlates poorly with the findings of Griffith et al. [5], Yavascaoglu et al. [8] and Naguib all [9] observed significant acceleration of onset time of rocuronium using same priming dose and priming interval. Satisfactory intubating conditions had been reported without muscle relaxant following a propofol-alfentanyl induction [10]. In addition, propofol was reported to produce significant depression of laryngeal reflexes [11, 12]. On the other hand, in this study, we used thiopental sodium (TPS), neither additional dose of TPS nor any inhalational agent except oxygen was used prior to tracheal intubation.

This is particularly true for fast-acting muscle relaxants where peripherally assessed onset of neuromuscular block can give no exact indication of moment when optimum laryngeal relaxation has first been achieved [13]. The observation of Jaochim et al. [6] correlates well with the present study in terms of TOF-ratio, which was around 0.57 and 0.54 at the time of successful intubation in group-II and group III respectively. In terms of intubating conditions, no significant difference was observed between group-II and group III in jaw relaxation (p = 0.698), vocal cords movement (p = 0.646) and response to intubation (p = 0.514). This result agrees with the study of Griffith et al. [5]. In this study it was found that about three-quarter (73%) of the patients of group-III, were feasible to be intubated within 60 seconds following single bolus dose of rocuronium 0.6 mg/kg. This result agrees with the findings of Scheiber et al. [14]. Our study also showed that the Suxamethonium group allowed much earlier intubation compared to the other two groups (p = 0.039) and in terms of intubating conditions, smooth intubation was significantly higher in Suxamethonium group (p = 0.043). This finding correlated well with the study of Cheng et al. [15].

Based on the intubation score as described by cooper et al [1], 64.0% of Group-1, 52.0% of Group-II and 44.0% of Group-III were categorized as having excellent outcome. The rest of the respective groups, except the subjects of the group-III had good outcome. The mean intubation scores in three groups were not statistically different (p = 0.286). In terms of unpleasant effects of priming, we observed that 1.3% of the patients of priming group had visual disturbances, 4% dyspnea, 1.3% difficulty in controlling tongue and 2.6% difficulty in swallowing during the priming interval and

90.6% was free of any unwanted side-effects. The TOF- ratio, 3 minutes after priming was around 0.87, this observation correlates well with the findings of Aziz et al [16]. From the results of this study, we also observed that Suxamethonium group allowed much earlier intubation compared to other two groups and in terms of intubating conditions, smooth intubation was significantly higher in Suxamethonium group. We also found that more than 75% of the patients of the remaining two groups were feasible to be intubated within 60 seconds with good to excellent intubating conditions and the mean intubation scores among the three groups were not statistically different (p=0.286). Therefore, rocuronium 0.6 mg/kg in single bolus dose following induction with thiopental sodium can be suitable alternative to Suxamethonium for rapid tracheal intubation for surgical procedures of short and medium duration.

Conclusion

Using priming technique with standard intubating dose of rocuronium has no beneficial effects on reducing intubation time and providing better intubating conditions over single bolus injection of rocuronium and this technique is not completely devoid of harmful effects to the patients. So, Rocuronium in single bolus injection can replace Suxamethonium for quick endotracheal intubation in surgical procedures of short and medium duration.

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Original Article

Treatment of Long Segment Anterior Urethral Stricture by Dorsal Free Graft Urethroplasty by Ventral Sagittal Urethrotomy Approach

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Abstract

Introduction: Long segment anterior urethral stricture involving the penile and bulbar urethra, is a common urological problem in Bangladesh and South Asian subcontinent. It is really difficult and challenging to manage. It is a feasibility study of applying a dorsal free graft to treat urethral stricture by the ventral sagittal urethrotomy approach without mobilizing the urethra. **Methodology:** In this prospective multicenter observational study, 50 cases of long segment or multiple anterior urethral strictures were studied over a period of one year from May 2005 to May 2006. All patients were treated by a full-thickness preputial or distal penile skin graft. The urethras were not separated from the corporal bodies and were opened ventrally in the midline over the stricture. The floor of the urethra was incised, and an elliptical raw area was created over the tunica on which graft skin was secured. The urethras were re-tabularized in one stage. **Results:** After a follow-up of 12 months, 1 recurrence developed and required optical internal urethrotomy (OIU). **Conclusion:** The ventral sagittal urethrotomy approach for long segment or multiple anterior urethral strictures by dorsal free graft urethroplasty is not only feasible and successful, but is also easy to perform.

Keywords: Dorsal inlay urethroplasty, ventral sagittal urethrotomy, anterior urethral stricture repair.

Abbreviations and Acronyms:

RGU & MCU = Retrograde Urethrogram and Micturating Cystourethrogram, BXO = Balanitis Xerotica Obliterans, Sec = Second, BMG = Buccal mucosal graft, OIU: Optical Internal Urethrotomy.

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Introduction

The traditional treatment of urethral stricture is urethral dilatation or urethrotomy [1]. Another modality of treatment for stricture urethra is urethroplasty. It may be anastomotic or substitution type. Anastomotic urethroplasty is achieved by excision of stricture segment and end to end spatulated anastomosis. It is curative for short segment (<2 cm) bulbar urethral stricture. It is not applicable for penile urethra because it shortens penile urethra which may interfere erection of penis later. Urethroplasty also be done by substitution of graft or flap. Traditionally, vascularized local skin flaps have been the most popular form of substitution urethroplasty in single stage or

staged procedures, but these are prone to late complications because of ballooning and diverticula formation, causing stasis of urine and leading to skin excoriation [1]. Free grafts of full-thickness penile or preputial skin used as ventral patch or tube have been in vogue for several decades, but are prone to shrinkage, leading to repeated stricture or diverticulum formation. Buccal mucosa used as above has recently become popular because of the ease of harvesting but has the same drawback [2]. Recently, dorsal free graft urethroplasty by mobilizing the urethra and incising the stricture dorsally has gained popularity, as the graft on the corporal bodies prevents ballooning [3, 4].

We describe a technique of laying open the stricture ventrally and then incising the urethra dorsally without mobilizing it to expose the tunica albuginea for free skin graft followed by re-tubularization of the urethra, with good results in long and multiple strictures in one stage.

Methods

In this prospective multicenter study of surgical repair of long anterior urethral stricture (stricture size ≥2 cm long) performed in Dhaka Medical College Hospital, Dhaka, Bangladesh, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh and Comfort Hospital, Dhaka, Bangladesh from May 2005 to May 2006. A total of 50 patients were selected for this study. Operations were performed by different urologist. The etiology of the stricture was inflammatory 19 patients (38%), iatrogenic 12 patients (24%), post-traumatic 8 patients (16%), BXO 5 patients (10%), and unknown in 6 patients (12%). The location of urethral stricture was bulbar in 27 patients (54%), penile in 9 patients (18%), bulbo-penile in 8 patients (16%) and peno-meatal in 6 patients (12%). The inclusion criteria were patients with ≥2 cm long anterior urethral strictures who were physically and mentally fit for surgery. We included patients who presented for primary consultation as well as those patients with previous failed repair. The exclusion criteria were, patient with <2 cm anterior urethral stricture; patient with unhealthy genital skin like Balanitis Xerotica Obliterans (BXO) involving penile shaft skin, malignancy, diabetes, bladder neck stenosis / hypertrophy, benign enlargement of prostate, neuropathic bladder, history of cerebro-vascular accident, associated posterior urethral stricture ,patient who were unwilling or unable to undergo surgery or incomplete patient records.

All patients were evaluated by history and physical examinations. A detail questionnaire was completed which included the patient's age, duration of disease, number of previous procedure or operations performed upon the patient for stricture urethra. Enquiry was made for the cause of the stricture in every case. Careful local examination was done to identify meatal stenosis. All patients were further evaluated by urine culture, uroflometry, residual urine measurement, RGU & MCU. The follow up records were also reviewed for recurrent stricture, fistula, urethral diverticulum, hair growth, meatal stenosis, chordee formation and infection.

Surgical technique

Following general or spinal anesthesia, patient was placed in supine or lithotomy position according to the location of the stricture. A 3-0 polypropyline traction suture was placed in the glans. The urethra was exposed at the site of stricture through a ventral midline incision. The stricture segment was split open ventrally over a bougie and the urethra was laid open for about 1 to 2 cm both proximally and distally into the healthy urethra. The full thickness of the dorsal wall of the urethra was then incised

in the midline over the stricture and for about 1 to 2 cm both proximally and distally into the healthy urethra to expose tunica albuginea. The margins of the incised dorsal urethra were dissected from the tunica albuginea by sharp dissection with the edge of a No-15 blade without lifting the two halves of the bisected urethra (Fig.1.A). This provides an adequate elliptical raw area up to 2 cm wide, over the tunica albuginea, between the edges of the dorsal wall of the urethra. The incised dorsal free margins of the urethra were anchored to the tunica albuginea by interrupted sutures using 5-0 polyglactin. Two cm wide sub-coronal or distal penile shaft skin was harvested by two parallel circumferential sub-coronal incisions and the length of the graft was determined according to the length of the urethral defects (Fig.1B, 1 C).

Graft tissue was placed in a pot of normal saline and was carefully defatted by sharp scissors using 3 times magnifications. Then harvested full thickness free graft was placed over the raw area of the tunica albuginea between the incised margins of dorsal wall of the urethra and was anchored by 5-0 polyglactin sutures to the edges of the incised dorsal wall of the urethra, incorporating the underlying tunica albuginea. The graft was further anchored to the underlying tunica albuginea at several points to prevent dead space using 5-0 polyglactin (Fig.1 D, E). The urethra was re-tubularized by continuous 5-0 polyglactin sutures over a 16 Fr. Foley Catheter (Fig.1 F, G). Compression dressing was applied. If there is no complication patient was discharged after 7 days. The catheter was removed after 3 weeks. Uroflowmetry and RGU were performed in all cases after removal of catheter. Further follow up done at 3 months, 6 months and 1 year after operation. 3 Patients were asked to follow-up on regular basis.

Results

In this series, fifty cases of long and multiple anterior urethral strictures ranging from 2 to 10 cm (mean 6.22cm) were operated on between May 2005 to May 2006 with follow-up of 12 months. Out of 50 patients ,2 patient developed complications shown in table I.

Table I. Complications of operation among the subjects (n=50).

Complications	Frequency n (%)
Re-stricture	1 (2)
Wound infection	1 (2)

Total number of patients developed complications was 2 (4%). Patient with wound infection was kept in hospital for 20 days due to development of temporary urethra-cutaneous fistula after removal of catheter. It was resolved after re-catheterization for another 7 days. Cosmetic appearances of penis were acceptable and harvesting of skin from distal shaft of circumcised penis did not hamper erection.

Before operation, all patients had poor urine flow rete according to uroflowmetry report. Post-operative uroflowmetry report shown in table II.

Table II. Uroflowmetry result among the subjects (n=50).

Uroflowmetry result	Frequency n (%)
Good and average	48 (96)
Poor	2 (4)

Good and average flow rate is considered as success and poor flow rate as failure. After removal of catheter (21 days after operation), uroflowmetry showed good flow rate (Q Max >15 ml/sec) and average flow rate (Q Ave=10-15 ml/sec in 48 patient (96 %), and poor urinary flow rate (Q Ave <10ml/sec) in 2 patient (4 %). During third follow up visit (12

months after operation), Uroflowmetry showed similar result. Thus, the overall success rate was 96%.

RGU & and MCU done in all patients preoperatively to identify site/sites of stricture, length of stricture. Post-operative RGU &MCU done in all patient after removal of catheter and 12 months after operation. The result of post-operative RGU & MCCU shown in table III.

Table III. RGU & MCU results among the subjects (n=50).

Urethral caliber	Frequency n (%)
Normal	48 (96)
Poor caliber	2 (4)

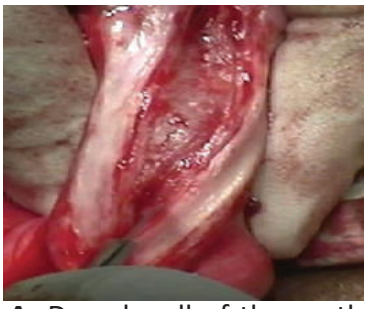

Figure 1. A: Dorsal wall of the urethra before operation.

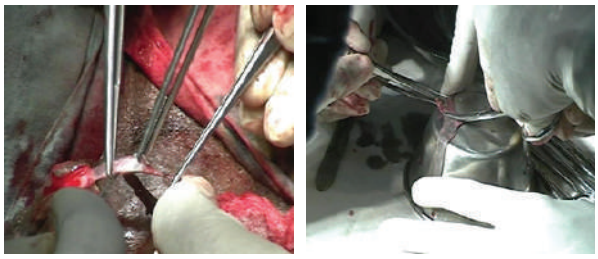

Figure 1. B & C: Harvesting of the skin from distal penile shaft dissected.

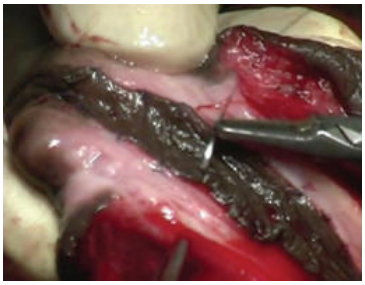

Figure 1. D: Anchoring of the graft.

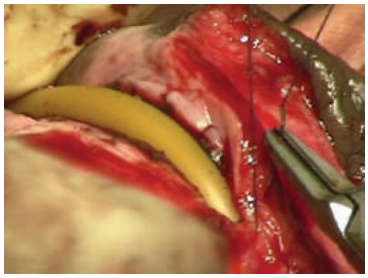

Figure 1. E: Re-tubularization of the urethra.

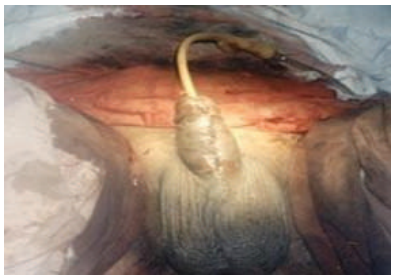

Figure 1. F: After operation.

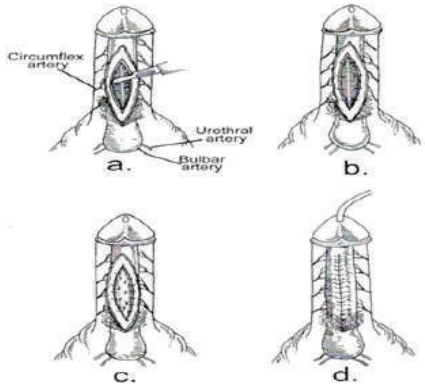

Figure 2: Steps of dorsal free graft urethroplasty.

a. Separation of margins of dorsal urethrotomy from corporal bodies
b. Securing of free margins to tunica albuginea
c. Fixation of dorsal free graft
d. Re-tabularization of urethra [3].

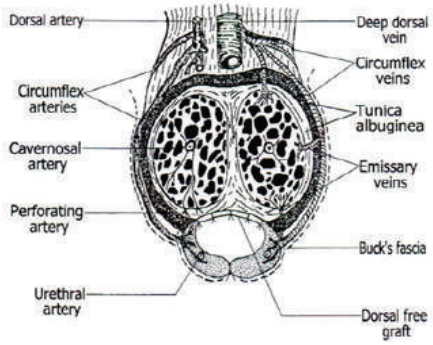

Figure 3: Cross-section of penis, dorsal free graft anchored [3].

Interpretation of RGU & MCU is good when report shows normal caliber urethra and good voiding study, average when report shows pseudodiverticulum or mild narrowing of urethra and poor when shows recurrence of stricture. In our study early success rate was 96% which persist more or less same 12 months after operation.

Discussion

The incidence of urethral stricture is increasing [1]. In this study penile or prepucial skin were substituted. They were intensely followed up for one year. In our study, age range of patient was 15 to 65 years. In series of Barbagli and colleagues, age range was 16 to 86 years [3]. In Iselin CE and Webster GD series, age range was 10 to 81 years and Asopa's series 16 to 54 years [4, 5].

In this study, most common site of stricture was bulbar urethra 54% (27). Most common length of stricture was 5 to 7 cm. In the series of Asopa and associates, length of the strictures ranged from 2-10 cm (mean 6 cm) [6]; in series of Barbagli and coworkers, it was 1.5 to 6 cm [3] and in series of Blum and colleagues, it was 3.5 to 10 cm long [7].

Most common cause of stricture was inflammatory (38 %). Whereas in series of Brannan and coworker's highest incidence of strictures were iatrogenic (31%), followed by inflammatory (21%) [8].

Again in series of Barbagli and coworkers, highest incidence of strictures were iatrogenic (60%), followed by inflammatory (16%) [3]. The cause of this statistical discrepancy may be the prompt effective antibiotic treatment of gonococcal urethritis and as a result it rarely progressed to gonococcal urethral stricture, but in the past, it was the main cause of inflammatory strictures [9].

Post-operative complications in our study were wound infection and temporary urethrocutaneous fistula (2%), and recurrent stricture (2%). Mean hospital stay was 9±2.43 days. Harvesting of distal shaft penile skin does not hamper erection and cosmetic appearance of external genitalia were acceptable in our series. Urine flow rate was >15ml/s in 96% of cases. In a series of dorsal free graft urethroplasty by ventral sagittal urethrotomy approach described by Asopa and colleagues, 8.3% cases developed temporary urethrocutaneous fistula which was resolved by additional catheterization for another 2 weeks. One patient (8.3%) developed recurrent stricture and was controlled by dilatation. Urinary flow rate was >15ml/s after 1 year follow up in all cases and obstructive symptoms were not complained during follow up [6]. Iselin and coworkers showed 97% success rate of dorsal free graft urethroplasty for bulbar urethral strictures after a median follow up of 19 months and in their series only one patient who had undergone 6 previous urethral procedures, had symptomatic stricture recurrence after 1 year, which was under dilatation and required no further treatment [4].

In series of Barbagli, all patients showed satisfactory urine flow rate >14ml/s after mean follow up of 35.5 months. Though 5 patients developed temporary anastomotic fistula which were resolved after 1 week of further catheterization [3].

Temporary urethrocutaneous fistula were detected in 3 cases out of 20 cases in another series, but they all resolved spontaneously and only one patient developed short segment recurrent stricture which was successfully treated by optical urethrotomy [10]. Our study is comparable with the series of other centers [4, 6, 10].

Webster and coworkers reported development of chordee during erection in 1 patient who

underwent free full thickness skin graft urethroplasty for penile urethral strictures [5]. Again Iselin and colleagues, Webster and associates restricted the use of dorsal free graft to bulbar urethral stricture because of concern that the inelasticity of the graft may result in erectile chordee [4, 5]. But the fear has proved unfounded, because graft survival and good healing without stricture have been the rule in all locations, provided adequate healthy tissue is present for the graft bed [8]. Dorsal placement of the graft is not associated with chordee [3, 6]. Barbagli and coworkers performed dorsal free graft urethroplasty in stricture of penile urethra and observed no such complications [3]. In our serise also, no one had developed any chordee. Dorsal free graft urethroplasty has a high early success rate of 97% in case of bulbar urethral stricture after average 19 months follow up [4, 5]. In our series success rate was almost 96%.

The length of the stricture is not been a limiting factor for dorsal free graft urethroplasty since preputial and penile shaft skin is pliable and redundant [3, 4]. Even when the patient is circumcised, there usually has redundant distal penile skin available for repair of any length of strictures [11].

Conclusion:

Based on the previous studies and our experience we can recommend dorsal free graft urethroplasty by local penile skin substitution is a good technique for management of long segment anterior urethral stricture. It is easy to perform because the urethra is not mobilized. The sizing of the graft is accurate and hence pooling of urine and semen is minimized. The risk to hamper the blood supply of the two halves of the bivalved urethra is less because it gets adequate blood supply from the corpora and from the circumflex arteries.

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Original Article

Short Term Effectiveness of Intra-articular Corticosteroid and Physiotherapy in Contrast to Medical Treatment and Physiotherapy in Patients with Frozen Shoulder in a District Hospital of Bangladesh

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Abstract

Background: Frozen shoulder is a troublesome condition in Orthopaedic practice, most often of unknown etiology. Standard treatment includes medical treatment, physiotherapy and intra-articular corticosteroid injection. Prognosis depends on several clinical factors and modality of treatment. **Objective:** The aim of this study was to assess the outcome of patients with frozen shoulder by different modalities of treatment in 250 Bedded Razia Naser District Hospital, Bagerhat. **Methodology:** This was an analytic cross-sectional study with a total number of 220 cases of frozen shoulder treated in 250 Bedded Razia Naser District Hospital, Bagerhat, Bangladesh. Study period was from January 2017 to April 2023. Study population was selected by convenient purposive sampling based on inclusion and exclusion criteria. Study population was divided into two sub-groups. Group A: 110 patients who was managed by only medical treatment; Group B: 110 patients who were managed by intra-articular corticosteroid injection in addition to the medical management. Ethical clearance was taken from the Ethical review committee of 250 Beded Razia Naser District Hospital, Bagerhat. **Result:** Patients of each group was age and sex matched. Most of the patients in both groups were housewives and housemaids. Outcome were more favorable in group B in terms of pain and disability. Visual Analogue Score (VAS) and Shoulder pain and disability index (SPADI) were used as the assessment tool here. At least 06 months follow up was done in each patient. Relapse rate was significantly lower in group B than in group A at 6th month. **Conclusion:** On the basis of pain, disability and relapse rate, responsiveness was higher in patient intra-articular corticosteroid injection along with medical treatment and physiotherapy than medical treatment and physiotherapy alone.

Keywords: Frozen shoulder, intra-articular corticosteroid.

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Introduction

Frozen shoulder is often considered as a frustrated condition both for Orthopaedic surgeons and patients. No clear cause has yet been found for the idiopathic type of frozen shoulder. Treatment of this condition is diffi-

cult and can result in astonishing outcomes [1]. Medical treatment, physiotherapy are effective treatment for frozen shoulder. In many researches, prevalence rate found variable. In a study, the prevalence rate was 2% in the general population [2]. It affects persons older than 40 year of age more commonly [3], and 70% of patients presenting with a frozen shoulder are women [4]. The condition affects diabetic (type 1) patients more often than healthy ones, with a prevalence of almost 11% in this population group [5]5. Griggs et al. [6] suggested with their results that female patients who do not have an intrinsic emotional, psychological or personality disorder can overcome adhesive capsulitis better than those who possess. The pathophysiological process is believed to involve synovial inflammation and fibrosis of the shoulder joint capsule [7]. Literature review suggests that frozen shoulder has four different clinical stages; inflammatory phase, freezing phase, frozen phase and thawing phase [1]. Clinical feature usually varies according to the phase of presentation [8]. Treatment option of frozen shoulder includes medical management, physiotherapy and intra-articular corticosteroid injection [9]. Oral non-steroidal anti-inflammatory medication can be initiated in patients who present with painful limited range of motion during the painful freezing phase [10]. It is suggested in the literature that an intra-articular injection is associated with better pain relief than physiotherapy, analgesics or placebo [11]. In our study, we evaluated the short-term effectiveness of intra-articular steroid injection along with medical treatment and physiotherapy in contrast to that of medical treatment and physiotherapy alone.

Methodology

This study was conducted as an analytic cross-sectional study with a total number of 220 cases of frozen shoulder treated in 250 bedded Razia Naser District Hospital, Bagerhat, Bangladesh from January 2017 to April 2023. Study population was selected by convenient purposive sampling based on inclusion (patients with frozen shoulder, age in between 15 to 75 years age, patients with no congenital abnormality) and exclusion criteria (patients with severe co-morbidities, patients with terminal care, liver failure, renal failure). All patients were divided into two sub-groups. Group A: 110 patients of frozen shoulder who was managed by only medical treatment; Group B: 110 patients who were managed by intra-articular corticosteroid (Triamcinolone) injection and physiotherapy in addition to the medical management and physiotherapy. At least 06 (six) months follow up was done in each patient. The survey data were analyzed using the statistics, such as- mean, SD, percentage etc. Informed consent was taken from all patients and ethical clearance was taken from the Ethical review committee of 250 bedded Razia Naser District Hospital, Bagerhat. Visual Analogue Score (VAS) and Shoulder pain and disability index (SPADI) were used as the assessment tool in this study to analyze the outcome [9, 10].

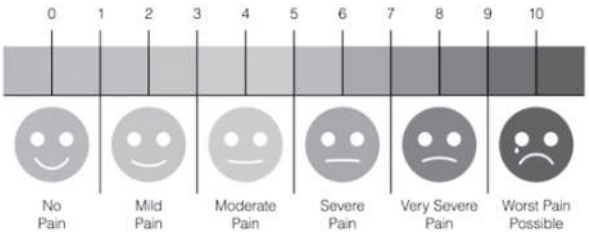

Figure 1: Visual Analogue Score (VAS).

Shoulder pain and disability index (SPADI): Integrated pain and disability score											
How severe the pain is?											
Indicators	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
At its worst?											
When lying on involved side?											
Reaching for something on a high shelf?											
Touching the back of your neck?											
Pushing with the involved arm?											

Figure 2: Pain scale.

How much difficulty does the patient have?											
Indicators	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Washing your hair?											
Washing your back?											
Putting on an undershirt or jumper?											
Putting on a shirt that buttons down the front?											
Putting on your pants?											
Putting an object on a high shelf?											
Carrying a heavy object of 10 pounds (4.5 kg)?											
Removing something from your back pocket?											

Figure 3: Disability scale.

Results

In group A, 30.9% (34) patients were male and 69.1% (76) patients were female; whereas, in case of group B, 40.9% (45) patients were male and 59.1% (65) patients were female.

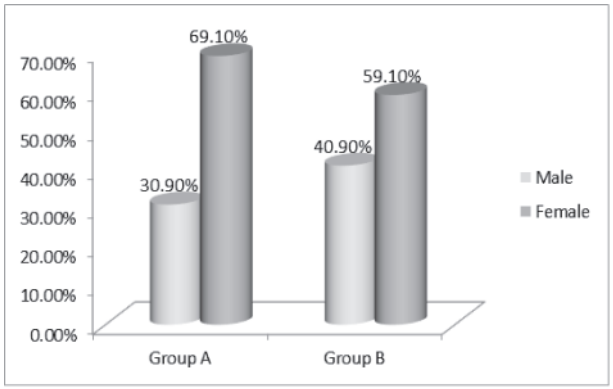

Figure 4: Sex distribution of the study groups with frozen shoulder.

Mean±SD of age was 35.6±8.2 and 33.5±7.5 years respectively in group A & B. Majority of the cases were in 31-40 years age in both groups (32.7% and 36.4% in respective groups).

Table I. Age distribution of patients with frozen shoulder.

Age	Group A		Group B	
(year)	n_1 (%)	Mean±SD	n_2 (%)	Mean±SD
<20	06 (5.5)		11 (10)	
21-30	13 (11.8)		15 (13.6)	
31-40	36 (32.7)		40 (36.4)	
41-50	28 (25.5)	35.6±8.2	22 (20)	33.5±7.5
51-60	16 (14.5)		17 (15.5)	
>60	11 (10)		5 (4.5)	
Total	110 (100)		110 (100)	

Regarding the occupation of the study patients, 30.0% (33) patients in group A and 25.5% (28) patients in group B were housewife. Frozen shoulder was also common in housemaids (18.1% and 22.7% in respective groups).

Table II. Occupation of the study patients.

Occupation	Group A n_1 (%)	Group B n_2 (%)
Housewife	33 (30)	28 (25.5)
Housemaid	20 (18.1)	25 (22.7)
Day labourer	15 (13.6)	16 (14.5)
Farmer	17 (15.5)	22 (20)
Player	3 (2.7)	2 (1.8)
Student	12 (10.9)	10 (9.1)
Others	10 (9.1)	7 (6.4)
Total	110 (100)	110 (100)

Medical treatment and physiotherapy were given to patients in Group A; and in group B, intra-articular injection corticosteroid (Triamcinolone) was given in addition to medical treatment and physiotherapy. Visual analogue scale (VAS) was used for evaluation of pain and follow-up in both study groups (where score 0 is no pain and score 10 is severe intractable pain) [12].

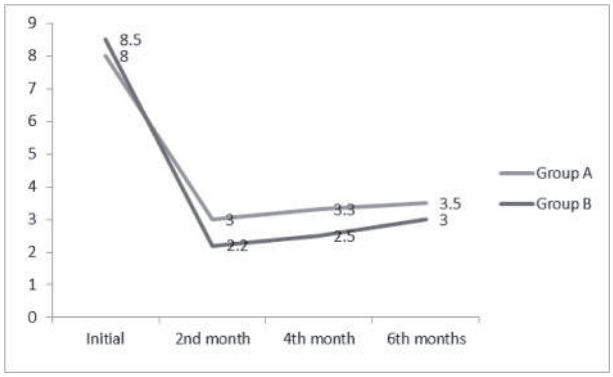

Figure 5: Assessment of pain in follow-up (using VAS).

Shoulder pain and disability index (SPADI) was used in this study as an assessment tool which was consists of pain score and disability score [12]. Pain and disability score was used for evaluation of pain in follow-up in both groups (where score 0 is no pain and score 10 is severe intractable pain) [13].

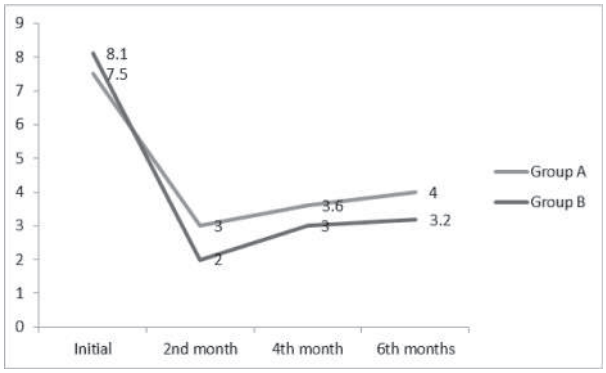

Figure 6: Assessment of pain & disability in follow-up (Shoulder pain and disability index-SPADI).

Incidence of relapse is relatively higher in case of group A in contrast to Group B. Overall relapse rate is represented in table 3.

Table III. Relapse rate in both study groups.

Follow-up	Group A n_1 (%)	Group B n_2 (%)
2nd month	10 (9.1)	4 (3.6)
4th month	15 (13.6)	5 (4.5)
6th month	18 (16.4)	9 (8.2)

Discussion

Majority of the patients with frozen shoulder was female in this study. 69.1% and 59.1% patients of group A and B was female. Peak incidence was seen in 31-40 years of age in both study groups (32.7% and 36.4% in respective groups). 25.5% and 20.0% patients in group A & B was in 41-50 years age. Mean±SD of age was 35.6±8.2 and 33.5±7.5 years respectively in both groups. In many studies it has been suggested that frozen shoulder mainly affects individuals of 40–60 years of age, with a female predominance. The exact incidence and prevalence of frozen shoulder are unknown, but many authors have quoted figures of 2%–5% in the general population [14, 15]. Occupation may have relation with frozen shoulder. Most of the patients in both groups were housewives and housemaids. In group A, 30.0% (33) patients

were housewife; whereas in group B, 25.5% (28) patients were housewife. 18.1% (20) and 22.7% (25) patients of respective groups were housemaid. Incidence was also high in day labourers and farmers. However, occupational relationship was not suggested in most of the researches [1].

Pain trends to fall after treatment (using the VAS). Highest response rate was seen at 2 months following treatment. Thereafter, pain trends increase slightly in both study groups. Better response rate in terms of pain was observed in case of group B in contrast to group A (using the VAS). Similar response rate was observed in terms of pain and disability. Shoulder pain and disability index (SPADI) was used to assess the pain and disability in the patients with frozen shoulder. Significant response was seen at 2nd months in both groups; however better result was observed in group B. Relapse rate was significantly higher in group A than in group B. At 6th month, relapse rate was 16.4% (18) in group A; whereas, in group B, it was 8.2% (09). Best and optimal outcome was observed in patients treated with intra-articular corticosteroid injection. Most of the researches suggests that effectiveness of intra-articular corticosteroid injection with physiotherapy is relatively good than medical treatment and physiotherapy alone in terms of pain and disability [16]. In majority of the studies, recurrence rate varied greatly [17]. However, recurrence in case of frozen shoulder is a rare situation depicted in some studies [12].

Conclusion

From the study it could be concluded that, intra-articular corticosteroid injection along with physiotherapy gives better result that medical treatment and physiotherapy in terms of pain, disability and relapse rate.

Conflict of Interest

The authors declare no conflict of interest.

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Original Article

Outcome of Limberg Flap Procedure for the Treatment of Primary and Recurrent Sacrococcygeal Pilonidal Sinus

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Abstract

Background and aim: Pilonidal sinus, especially the sacrococcygeal variety, is an acquired condition most commonly seen in young adult males. Different surgical treatment of sacrococcygeal pilonidal disease has been described with variable morbidity and recurrence rate. Aim of this study is to evaluate the outcome of Limberg procedure in treatment of both primary and recurrent sacrococcygeal pilonidal sinus. **Methods:** This prospective study was conducted in the Department of Colorectal Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from March, 2020 to February, 2022. During this period, 30 patients of sacrococcygeal pilonidal sinus were included. All the patients successfully underwent rhomboid excision with Limberg flap transposition. Duration of operation, postoperative pain, duration of hospital stays, time to return to work and postoperative complications including recurrence were noted. A mean follow-up of 18 months was performed on all patients an out-patient basis. **Results:** There were 28 males (93.75%) and 2 females (6.25%), with a mean age of 28 years. Among them, 12 patients had recurrent disease. Mean operative time was about 50 minutes. Mean pain score (VAS scale) was 3.65. The mean length of hospital stay was 4 days and mean time to return to work was 18 days. Four patients (13.33%) presented with post-operative complications of which one patient had recurrence (3.33%). **Conclusion:** Limberg flap technique is an effective procedure for the treatment of sacrococcygeal pilonidal sinus disease, both in primary and recurrent cases; and is associated with few complications and even fewer recurrences.

Keywords: Sacrococcygeal pilonidal sinus, rhomboid excision, Limberg flap.

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Introduction

Pilonidal sinus is characteristically a blind epithelial tract which is most commonly seen in the sacrococcygeal region and also been described in the axilla, suprapubic area, peri-umblical zone and between the fingers of the hand1. The name pilonidal is taken from Latin meaning “nest of hairs.” The estimated incidence is 26 per 1, 00,000 people [1, 2]. It generally presents as a cyst, abscess, or sinus tracts with or without discharge [2]. Men affected more often than women, rare both before puberty and after the age of 40 years [3]. Rarely may it present in the fourth decade [3].

The etiology and pathogenesis of pilonidal sinus is still a matter of debate. The current consensus holds that loose hairs trapped in the

natal cleft traumatize and penetrate the skin, creating a foreign body reaction that may ultimately lead to formation of midline pits and, in some cases, secondary infection [4]. Risk factors associated with pilonidal disease include obesity, a sedentary lifestyle, repetitive trauma or irritation to the gluteal cleft skin, familial history of pilonidal disease, and a hirsute body habitus [4, 5]. Karydakis proposed three main causative factors, namely high quantity of hair, extreme force, and vulnerability to infection [6].

Numerous treatment options are available like gluteal cleft hair removal, tract ablation by fibrin glue or laser, simple excision with or without primary closure, and wide excision with flap reconstruction [4]. The main complication is recurrence; the literature review suggested that it ranges from 20–40% regardless of the technique used [5].

Literature study shows that Limberg flap reconstruction following rhomboid excision of the sinus area designed by Limberg [7] in 1946 is superior to primary closure and other flap procedures8,9 and a safe and reliable method for both primary and recurrent sacrococcygeal pilonidal sinus disease with low complication and recurrence rates.

In this study, we present our experience of Limberg flap for the treatment of both primary and recurrent sacrococcygeal pilonidal sinus disease.

Aims and Objective

To evaluate the outcome of Limberg flap procedure for primary and recurrent sacrococcygeal pilonidal sinus in terms of postoperative pain, duration of hospital stay, time to return to work, postoperative complications and recurrence.

Materials and Methods

This is a prospective observational study carried out at the Department of Colorectal Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from March, 2020 to February, 2022. Ethical clearance was taken from Institutional Review Board (IRB), BSMMU.

Inclusion criteria: Patients having sacrococcygeal pilonidal sinus, either primary or recurrent (having history of previous definitive surgery) or having history of incision and drainage for previous pilonidal abscess.

Exclusion criteria: Patients having active abscess and patient having diagnostic dilemma (e.g.: Crohn's disease, fistula-in-ano, tuberculosis).

Operative procedure: Under spinal anesthesia, patient was placed in jackknife position with buttocks strapped. Area to be excised and the flap lines were mapped on the skin (Fig. 1). The rhomboid incision including the sinus and its extensions was made down to the presacral fascia. The diseased area was removed en bloc (Fig. 2). A rhombic shaped fasciocutaneous flap was developed and transposed into the rhombic defect without tension (Figure-3). Suction drain was placed, subcutaneous tissue was approximated and skin was closed (Figure-4). Antibiotics were given for 7 days. The suction drain removed usually on 4th POD and sutures removed on 10th POD. The patients were advised not to put pressure on the flap for 3 weeks and were followed up for at least 6 months in the Colorectal OPD. The importance of anal hygiene and hair removal from the area was stressed and patients were encouraged to return to normal activity.

Results

The present study consisted of 28 males (93.33%) and 2 females (6.67%), with a mean age of 28 years (range 18–38 years). Of the 30 patients, 18(60%) had primary disease, 8(26.67%) had recurrent disease (history of

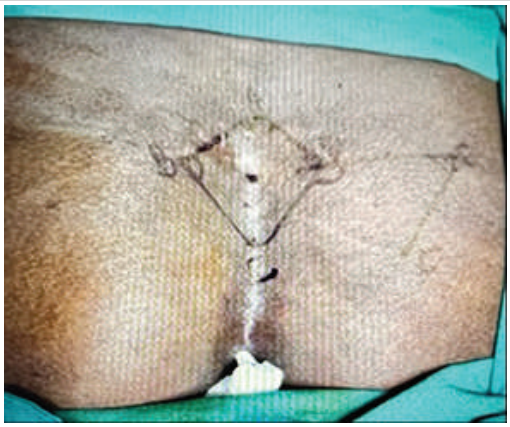

Figure 1: Marking with letters.

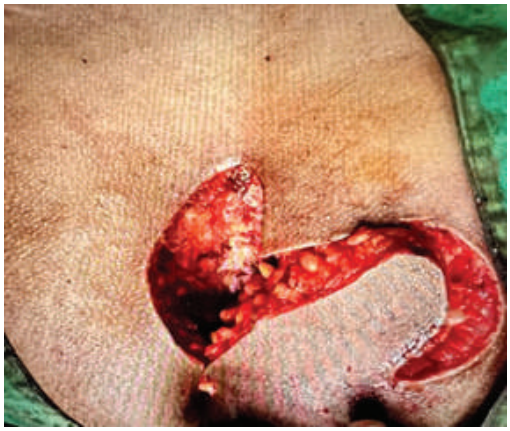

Figure 3: Transposition of mobilized flap.

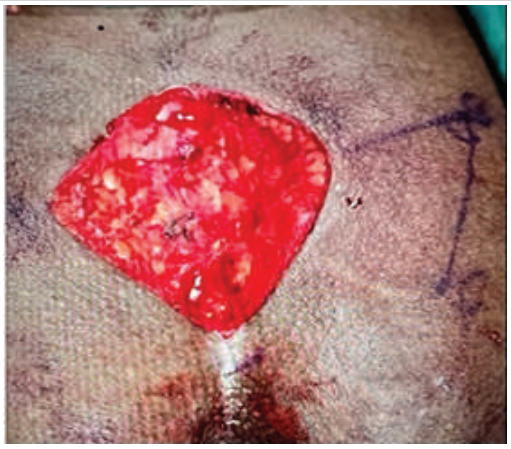

Figure 2: Excision till deep fascia.

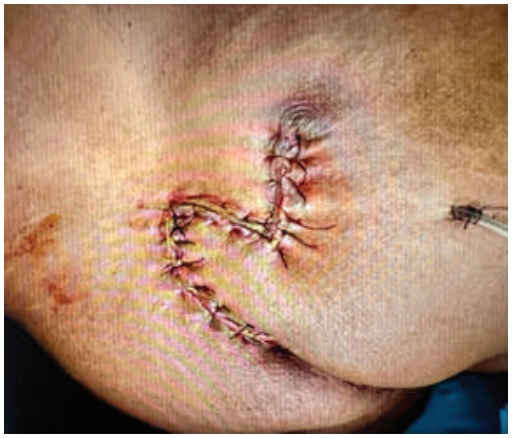

Figure 4: Final outcome.

wide excision with primary closure), and 4(13.33%) came up after having previous incision and drainage for pilonidal abscess.

Mean operative time was about 50 minutes (range 40-60 minutes). Pain score, as calculated by VAS (visual analogue scale), had a mean of 3.65 (range 3-7). The mean length of hospital stay was 4 days (range 3-7 days), and the mean time to return to work was 18 days (range 11-31 day). The mean time to drain removal and suture removal were 4 days (range 2-15 days) and 10 days (range 10-21 days), respectively. 26 patients (86.67%) including both the females had full primary healing without any complication.

Four patients (13.33%), all male, had complications. One patient had flap tip necrosis, requiring diligent dressing and antibiotic coverage for 3 weeks to heal by secondary intension. Another patient had complete wound dehiscence after removal of sutures on 10th POD and managed by re-suturing under local anesthesia. There was prolonged hospital stay (7 days) for one patient owing to pain and protracted drain output which was caused probably due to seroma formation beneath the flap. Finally, we had one case of recurrence (3.33%). The case presented initially as a large hematoma followed by evacuation, infection and flap failure. Although the wound healed by secondary intension after long conservative treatment, the patient presented with recurrent abscess in the operated area 3 months after the surgery. The abscess was laid open, drained and secondary wound healing allowed for final recovery of the patient.

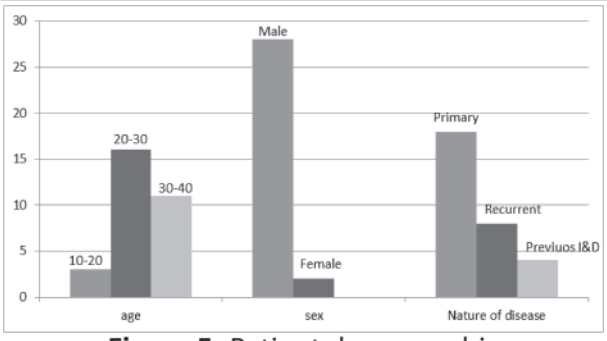

Figure 5: Patient demographics.

Table I. Operative data (n=30).

Variable	Range (Mean)
Operating time (minute)	40-60 (50)
Pain score (VAS scale)	3-7 (3.65)
Hospital stay (days)	3-7 (4)
Drain removal (days)	2-15 (4)
Suture removal (days)	10-21 (10)
Return to work (days)	11-31 (18)

Table II. Postoperative complications.

Name of complication	Number of patients (%)
Flap tip necrosis	1 (3.33%)
Complete wound dehiscence	1 (3.33%)
Seroma formation with delayed healing	1 (3.33%)
Recurrence	1 (3.33%)
Overall	4 (13.33%)

Discussion

Surgical treatment of pilonidal sinus is challenging due to the high rates of wound infection, impaired healing and recurrence. The surgical treatment should intend towards removing all the sinus tracts as well as the predisposing factors that contribute in the formation of pilonidal sinus. The goals of the ideal procedure for the treatment should be reliable wound healing, a low risk of recurrence, a short hospital stay and early return to normal daily activity.

Recurrence is the main problem associated with all surgeries described, which ranges from 21-100% for incision and drainage, 5.5–33% for excision and open packing, 8% for marsupialization, 3.3–11% for Z-plasty [5, 8, 9]. The advantage of Limberg flap reconstruction is that it flattens the natal cleft with a large, well vascularized pedicle that can be sutured without tension [7]. Any midline dead space is eliminated and midline scar avoided. It is a particularly useful technique for complex primary sinuses with multiple pits and also for recurrent cases. Finally, it is relatively easier to design and perform than other flap transposition techniques.

Most studies [10-14] have reported mean operating time 45 minutes, mean VAS pain score 3.5, mean hospital stay 3 days, mean time to drain and suture removal 2 and 10 days, and mean time to return to work 15 days; which is similar to our results. In our study the overall complication rate was 13.33% with one recurrence (3.33%) which are comparable with other series that have shown wound complication of 0-16% and recurrence rates of 0–5% [5, 8, 9, 11-14].

One recognized complication of flap reconstruction is seroma or hematoma formation under the flap, sometimes resulting in wound dehiscence. Use of suction drain has been advocated to mitigate this problem [12, 14], and we agree to it as we had experienced two similar complications.

The importance of the post-operative wound care should also be stressed. Exercise or sitting down on the wound should be avoided for two weeks and the patient has to return slowly to normal activities. Hair removal by shaving the edges of the wound is recommended and maintenance of perianal hygiene is mandatory.

Conclusion

Limberg flap reconstruction after excision of the pilonidal sinus is an easy technique to perform in quick time, useful in both primary and recurrent diseases, with very low complication and recurrence rates. Other advantages are quick healing time, short hospital stay, and early return to daily life. However, preopera-

tive counseling with the patient is a must as the procedure is not without complications and may result in prolonged morbidity and/or a second procedure in a few cases.

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Original Article

Patterns of Semen Analysis and Insights into Male Infertility: A Regional Experience from Bangladesh

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Abstract

Background: Male infertility is a significant global health issue, often identified through semen analysis. Affecting 8-12% of couples globally, infertility is often due to sperm abnormalities, varicocele, endocrine disorders, infections, and genetic factors. Environmental exposures, lifestyle factors, and nutritional deficiencies also contribute. Semen analysis, a primary diagnostic tool, measures parameters like sperm count and mobility but has limitations. Despite its importance, semen analysis is underutilized due to social stigma, especially in conservative societies. **Aim of the study:** This study aims to evaluate the patterns of semen analysis parameters among men seeking fertility. **Methods:** This prospective observational study was conducted over one year from July 2023 to June 2024 at Satkhira Medical College and Hospital, Bangladesh, targeting 109 male participants referred for semen analysis related to infertility and venereal infections. Using purposive sampling, males aged 15-60 years with no prior treatments affecting semen quality were included. Exclusions were those with previous treatments or inability to provide a sample. Participants provided semen samples after 3-4 days of abstinence and analyzed within 60 minutes. Following WHO guidelines, samples were assessed for sperm concentration, motility, morphology, and volume. Data were collected via validated questionnaires, with ethical approval and informed consent. Statistical analysis was performed using SPSS. **Results:** The study involved participants primarily aged 30–39 years (41.28%), with 56.88% having a normal BMI, 26.61% overweight, and 7.34% underweight. Infertility duration was most commonly 1–3 years (38.53%). Most had normal semen volume (73.39%, mean 3.07±0.77 mL), with 11.01% having low volume. Moderate sperm concentration (15–50 million/mL) was seen in 50.46%, with low levels in 26.61%. Diagnoses included oligospermia (31.19%), azoospermia (25.69%), and asthenozoospermia (22.94%). High pus (95.41%) and epithelial cell prevalence (92.66%) were noted. **Conclusion:** The study on male infertility revealed high rates of oligospermia, azoospermia, and asthenozoospermia. The presence of pus and epithelial cells suggests underlying infections. These findings stress the need for targeted interventions and lifestyle modifications to address male infertility.

Keywords: Semen Analysis and Male Infertility.

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Introduction

Infertility is a significant global health issue that encompasses physical, psychological, and social dimensions. It is clinically defined as the failure to achieve a successful pregnancy after 12 months or more of regular unprotected sexual intercourse [1]. Infertility can be categorized into primary infertility, where a couple has never achieved a pregnancy, and secondary infertility, which occurs when there has been at least one prior conception but the couple is unable to conceive again [2]. Globally, infertility affects approximately 8-12% of couples, with prevalence rates ranging from 5% to 30% across different regions [3,4]. It is primarily attributed to abnormalities in sperm motility, morphology, concentration, and count [5]. Common causes include varicocele, endocrinal disorders, infections of the male reproductive tract, ejaculatory disorders, chromosomal aberrations, genetic mutations, and idiopathic factors where no specific cause can be identified [6]. Environmental exposures, sedentary lifestyles, smoking, alcohol consumption, nutritional deficiencies, and advanced age are also significant risk factors [6,7]. Semen analysis is the cornerstone of male infertility evaluation, serving as a primary diagnostic tool to assess fertility potential [1]. This test involves measuring parameters such as sperm count, mobility and semen volume [5]. However, semen analysis has limitations, including its inability to assess the process of capacitation in the female reproductive tract, the acquisition of sperm surface proteins, and the sperm's ability to fertilize an egg [1]. Despite these challenges, it remains an indispensable tool, particularly in resource-limited settings where access to advanced diagnostic techniques is constrained [8]. Globally, 30-50% of men have semen quality issues of unknown origin, with contributing factors ranging from infections to oxidative stress and environmental exposures [9]. For instance, oxidative stress, which increases inflammatory cytokines in seminal plasma, can impair sperm quality and damage DNA [10]. Nutritional deficiencies, such as low Vitamin D levels, also play a crucial role in influencing sperm health [11]. Other lifestyle factors, including occupational exposure to heat and chemicals, excessive use of electronic devices, and tight clothing, are additional risk factors for male infertility [6]. Despite its clinical significance, semen analysis is often underutilized due to social stigma and embarrassment, particularly in conservative societies [5]. Efforts to standardize semen analysis have included the use of computer-assisted semen analysis (CASA) to improve accuracy and minimize human error. However, adherence to the World Health Organization (WHO) guidelines for conducting semen analysis remains inconsistent across laboratories [12]. In rural and resource-constrained settings, the lack of access to reproductive healthcare services further compounds the challenges of diagnosing and managing male infertility [8]. Understanding the regional patterns of semen parameters is essential to address the growing burden of male infertility, particularly in resource-limited settings like Bangladesh, where reproductive healthcare access is often inadequate. This study aims to evaluate the patterns of semen analysis parameters among men seeking fertility evaluation in Bangladesh, focusing on the prevalence of abnormalities and their associations with demographic and clinical factors.

Methodology

This meticulously designed prospective observational study was conducted within the Department of Gynecology and Obstetrics at Satkhira Medical College and Hospital, Satkhira, Bangladesh. The study spanned a comprehensive period of one year, from July 2023 to June 2024. A purposive sampling method was

employed to select a well-defined cohort of 109 male participants referred to the laboratory for semen analysis as part of infertility evaluations and investigations into venereal infections. The selection process adhered to rigorously applied inclusion and exclusion criteria to ensure the scientific validity, reliability, and clinical applicability of the findings.

Inclusion Criteria

This study included males aged between 15 and 60 with no history of prior treatment or medications known to affect semen quality or fertility.

Exclusion Criteria

Males with a history of treatment, such as antioxidant therapy, surgical interventions (e.g., varicocelectomy or seminal tract reconstruction) and patients who were unable to provide a semen sample by masturbation were excluded.

Sample Collection

Participants were instructed to maintain abstinence from sexual activity for 3–4 days before providing semen samples. Samples were collected aseptically via masturbation into sterile, wide-mouthed containers within the hospital premises to prevent contamination. The samples were analyzed within 60 minutes of collection to ensure accuracy and reliability.

Semen Analysis

Semen analysis was conducted following the standardized protocols outlined by the World Health Organization (WHO) [1]. The samples were categorized based on sperm concentration into three primary groups: Normospermia, Sperm count between 15 million/ml and 120 million/ml, Oligospermia; Sperm count below 15 million/ml; Azoospermia, Complete absence of sperm in the ejaculate. Additionally, parameters such as ejaculate volume, the presence of pus cells, motility, and morphology were assessed. Sperm abnormalities were classified as follows, based on WHO definitions: Asthenospermia: Reduced sperm motility; Teratozoospermia: Abnormal sperm morphology; Oligospermia: A combination of reduced sperm count, poor motility and abnormal morphology; Hypospermia: Ejaculate volume less than 2 ml.

Data Collection

Data collection was performed using a structured and validated questionnaire that captured a broad spectrum of variables, including demographic data and clinical information. To ensure informed participation, each participant was given a detailed explanation of the study's objectives, methodology, and potential implications. Written informed consent was obtained from all participants before inclusion in the study. Ethical approval was obtained from the institutional ethics review board before initiating the study.

Statistical Analysis

The collected data were systematically compiled into detailed tables and figures, supplemented by comprehensive narratives for enhanced clarity. Statistical analysis was performed using SPSS software (version 26). Continuous variables were presented as mean ± standard deviation (SD), while categorical variables were expressed as frequencies and percentages.

Results

The study participants were primarily aged 30–39 years (41.28%), with 56.88% having a normal BMI of 18.5–24.9, while 26.61% were overweight and 7.34% underweight (Table 1). The duration of infertility was most commonly reported as 1–3 years (38.53%), followed by 4–6 years (25.69%), and over 7 years (22.02%), with only 13.76% experiencing infertility for less than a year (Table 2). In this study, most participants provided normal semen volume of 1.5–4.5 mL (73.39%, mean 3.07±0.77 mL), while 11.01% had low semen volume (<1.5 mL). Regarding sperm concentration, moder-

ate levels (15–50 million/mL) were observed in 50.46% of participants, and low levels (<15 million/mL) were present in 26.61%, with a mean sperm concentration of 77.85±25.24 million/mL (Table 3). Sperm motility patterns showed average progressive motility of 52.32% (range 10–75%), while non-progressive motility accounted for 26.02% and immotile sperm for 21.41% on average (Table 4). Diagnoses revealed oligospermia in 31.19% of cases, followed by azoospermia in 25.69%, asthenozoospermia in 22.94%, and teratozoospermia in 20.18% (Table 5). Additionally, a high prevalence of pus cells (95.41%, mean 6.03±2.41) and epithelial cells (92.66%, mean 4.34±2.08) was observed in the study population (Table 6).

Table I. Demographic and lifestyle characteristics of study participants (n=109).

Variable		Frequency n (%)
Age (year)	20-29	18 (16.51)
	30-39	45 (41.28)
	40-49	33 (30.28)
	50-59	13 (11.93)
BMI (kg/m²)	< 18.5	8 (7.34)
	18.5-24.9	62 (56.88)
	25-29.9	29 (26.61)
	30+	10 (9.17)

Table II. Duration of infertility among study patients (n=109).

Duration of Infertility (years)	Frequency n (%)
< 1	15 (13.76)
1-3	42 (38.53)
4-6	28 (25.69)
7+	24 (22.02)

Table III. Distribution of semen volume and sperm concentration among study patients (n=109).

Variable		Frequency n (%)	Mean±SD
Semen Volume (ml)	< 1.5	12 (11.01)	3.07 ± 0.77
	1.5-4.5	80 (73.39)	
	> 4.5	17 (15.6)	
Sperm Conc. (M/mL)	29 (26.61)	29 (26.61)	77.85±25.24
	55 (50.46)	55 (50.46)	
	25 (22.94)	25 (22.94)	

Table IV. Sperm motility patterns among study patients (n=109).

Motility	Range	Mean±SD
Progressive Motility (%)	52.32±16.92	10-75
Non-progressive Motility (%)	26.02±14.33	10-80
Immotile (%)	21.41±6.78	10-40

Table V. Distribution of cases of semen parameters among study patients (n=109).

Diagnosis	Frequency n (%)
Oligospermia	34 (31.19)
Azoospermia	28 (25.69)
Asthenozoospermia	25 (22.94)
Teratozoospermia	22 (20.18)

Table VI. Presence of pus cells and epithelial cells in study patients (n=109).

Variables	Frequency n (%)	Mean±SD	Range
Presence of Pus cell	104 (95.41)	6.03±2.41	1-10
Presence of Epi cell	101 (92.66)	4.34±2.08	1-10

Discussion

Infertility is a common medical problem, with the male factor being involved in approximately 50% of cases [13]. It is influenced by a variety of factors, including lifestyle habits, environmental exposures, and

underlying medical conditions, which can impair semen quality and sperm function [14]. Semen analysis remains the cornerstone diagnostic tool for evaluating male infertility, providing critical insights into sperm concentration, motility, morphology, and seminal fluid characteristics [15]. Recent studies emphasize the importance of region-specific data to understand the demographic and cultural determinants influencing male reproductive health, particularly in low-resource settings like Bangladesh. By analyzing patterns of semen parameters, researchers can identify prevalent abnormalities and tailor interventions to improve fertility outcomes in affected populations. In our study, we investigated the patterns of semen analysis and their implications for male infertility within a Bangladeshi cohort. The majority of participants were aged between 30–39 years (41.28%), followed by those aged 40–49 years (30.28%). This demographic distribution aligns with prior studies [16]. Over half of the participants (56.88%) had a normal BMI, while 26.61% were categorized as overweight. This is a notable finding, as previous research highlights an association between increased BMI-impaired spermatogenesis and hormonal imbalance, which are key contributors to subfertility [17]. Regarding the duration of infertility, most participants (38.53%) experienced infertility for 1-3 years, while 25.69% had infertility for 4-6 years. Moreover, our study observed that prolonged infertility (>7 years) was reported in 22.02% of participants. These findings are consistent with those of Diallo et al., who reported a mean infertility duration of 5.3 years [18]. Semen analysis is a crucial diagnostic tool for male infertility, and in the present study, we found that a majority of men (73.39%) had semen volumes between 1.5-4.5 mL, with a mean of 3.07±0.77 mL. Interestingly, 11.01% of the participants exhibited semen volumes below the threshold of 1.5 mL, a finding indicative of hypocupremia. These results are consistent with observations reported in prior studies, which highlight the prevalence of this condition among individuals with infertility [19]. However, a significant portion of participants exhibited abnormal sperm concentrations, with 26.61% showing concentrations lower than 15 million/mL, a hallmark of oligospermia. This finding is consistent with studies from India and China, where oligospermia is one of the most common diagnoses in male infertility [20]. Our analysis also revealed that 25.69% of participants were diagnosed with azoospermia, a more severe form of infertility. Azoospermia is a critical condition that warrants further evaluation for underlying causes, such as genetic factors or blockages in the reproductive tract [21]. Similarly, asthenozoospermia, affecting 22.94% of our participants, is another common condition that impairs sperm motility. Sperm motility is a key determinant of male fertility, and our study found a mean progressive motility of 52.32±16.92%. This is lower than the WHO's reference value of 32% for progressive motility, suggesting that many participants had suboptimal sperm motility [22]. Non-progressive motility and immotility were also significant in our cohort, which aligns with findings from another study that identify sperm motility as a major factor in male infertility [23]. In terms of sperm morphology, 20.18% of our study participants exhibited teratozoospermia, which is consistent with the findings of Atashpour et al. (2018), who reported that abnormal sperm morphology is often associated with male infertility. Sperm morphology plays a crucial role in male fertility, with the proportion of morphologically normal spermatozoa in the ejaculate being biologically significant. Sperm cells exhibiting abnormal

morphology can negatively impact fertilization rates [24]. In terms of sperm morphology, 20.18% of our study participants exhibited teratozoospermia, which is consistent with the findings of Tilahun et al. (2022), who reported that abnormal sperm morphology is often associated with male infertility [19]. It is also comparable to other studies conducted in Nigeria [25]. Our study also assessed the presence of pus and epithelial cells in semen samples. The findings indicated a high frequency of pus cells (95.41%) and epithelial cells (92.66%) in the majority of the samples. This suggests a potential underlying infection or inflammation in the male reproductive system, which is a known factor contributing to infertility [26].

Limitations of the study

The cross-sectional design precludes establishing causal relationships between observed semen abnormalities and infertility. Detailed hormonal profiles and genetic analyses were not included, which could provide deeper insights into the etiology of male infertility. Additionally, lifestyle factors were self-reported, introducing the possibility of reporting bias.

Conclusion

In conclusion, the study highlights significant insights into male infertility through a comprehensive analysis of semen parameters among a Bangladeshi cohort. High rates of oligospermia (31.19%), azoospermia (25.69%), and asthenozoospermia (22.94%) were observed. The presence of pus cells and epithelial cells in many samples suggests potential underlying infections. These findings emphasize the need for targeted interventions and lifestyle modifications to address male infertility.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

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