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Original Research Article

Surgical Site Infections in Patients after Posterior Lumbar Spine Fusions

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Abstract: ***Background:*** Posterior lumbar spine fusions (PLSF) surgery is widely used in the field of spinal surgery for the treatment of lumbar spinal stenosis and spondylolisthesis, because of its surgical effectiveness and simple approach. But in such surgery, surgical site infection (SSI) is a matter of concern. In Bangladesh, we have very few research-oriented information regarding SSI and related complications after posterior lumbar spine fusions (PLSF) among patients. Aim of the study: The aim of to this study was to determine the incidences of postoperative surgical site infection after lumbar spinal surgery and its several characteristics. ***Methods:*** This study was a prospective observational study which was conducted in the department of Orthopedics, Holy Family Red Crescent Hospital Dhaka, Bangladesh during the period from March 2019 to December 2019. In total 47 patients of surgical site infections (SSI) following posterior lumbar spine fusions (PLSF) from several age groups were selected as the study people. Data regarding causes of surgery, frequencies of SSIs, associated causative organisms and other clinical status were recorded and analyzed. All data were processed, analyzed and disseminated by MS Office and SPSS programs as per need. ***Results:*** In analyzing types of SSI after posterior lumbar surgery among participants we observed 38.30%, 34.04% and 21.28% patients were with lumbar spinal stenosis and lumbar spondylolisthesis and lumbar disc herniation respectively. Among all the participants, among the highest number of patients S. aureus was associated as (19%) were found among noticeable number of patients. a single micro-organism. Besides these, MSSA (19%), S. epidermidis (26%) and MRSE. ***Conclusion:*** The pre-assessment of microbiological characteristics should be done in all cases of surgical site infections (SSIs) in patients after posterior lumbar spine fusions. Prompt application of antibiotics may reduce the complications in patients after posterior lumbar spine fusions.

Keywords: Surgical site infection (SSI), Posterior lumber spine fusions (PLSF), Spondylolisthesis.

1. INTRODUCTION

Posterior lumbar spine fusions (PLSF) surgery is widely used in the field of spinal surgery for the treatment of lumbar spinal stenosis and spondylolisthesis, because of its surgical effectiveness and simple approach. But in such surgery, surgical site infection (SSI) is a matter of concern. Considering the simple approach and surgical effectiveness, in the field of spinal surgery in treating spondylolisthesis and lumbar spinal stenosis posterior lumbar fusion (PLIF) surgery is widely used [1]. Very common cause of unsatisfactory outcomes from the surgical procedures and prolongation of hospitalization among the patients after spinal surgery [2]. In a study it was claimed that, SSI (Surgical site infection) is the third most frequently noted nosocomial infection, accounting for 14% to 16% of total cases of infection among hospitalized patients [3]. Surgical site infections (SSIs) are a significant economic burden for in the health care system. The costs associated with surgical site infections in the US and Europe range from $15,800 to $43,900 for each newly reported case of surgical site infections [4, 5].

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Moreover, surgical site infections are a direct factor that affects one of the most important indicators in the health-care institutions [6]. Some retrospective randomized trials confirm the effectiveness of individual antimicrobial drugs in preventing surgical site infections in patients after spinal surgery [7, 8]. When choosing antibacterial drugs, it is necessary to take into account their broad activity in vitro with respect to the most probable pathogens characteristic for this species and the localization of SSIs [9]. The major objective of to this study was to determine the incidences of postoperative surgical site infection after lumbar spinal surgery and its several characteristics.

2. METHODOLOGY

This study was a prospective observational study which was conducted in the department of Orthopedics, Holy Family Red Crescent Hospital Dhaka, Bangladesh during the period from March 2019 to December 2019. In total 47 patients of surgical site infections (SSI) following posterior lumbar spine fusions (PLSF) from several age groups were selected as the study people. Proper written consents were taken from all the participants before data collection. As per the exclusion criteria of this study, patients of age >60 years, patients with osteoporosis, spine trauma, decompensated DM, chronic heart disease (CHD), renal failure and/or secondary immunodeficiency states were excluded from the study. Data regarding the duration of SSI symptoms from surgery period, prevalence of SSI after the first operation, after repeated operations on the lumbosacral spine, and the frequency of complications were recorded. As per the methodological recommendations of sanitary-epidemiological regime, all the bacteriological assessments of the postoperative wounds were performed. To identify the microbial association during the bacteriological examination, the detected microorganisms were individually recorded. Data regarding causes of surgery, frequencies of SSIs, associated causative organisms and other clinical status were recorded and analyzed. The relationship between the microbiological and surgical characteristics of SSIs was estimated by using $\chi 2$ criterion. A significance threshold of p value> 0.05 was set. All data were processed, analyzed and disseminated by MS Office and SPSS programs as per need.

3. RESULT

In this study, the highest number of participants was from 31-50 years' age group. Besides this, 17% participants were from 18-30 years' age group and the rest 23% were from >50 years' age group. Among total participants, 45% (n=21) were male and 55% (n=26) were female. So male-female ratio of the participants was 1:1.24. In analyzing types of SSI after posterior lumbar surgery among participants we observed 38.30%, 34.04% and 21.28% patients were with lumbar spinal stenosis, lumbar spondylolisthesis and lumbar disc herniation respectively. Among all the participants, obese patient were 21%. Besides these, 12.77%, 19.15%, 17.02%, 12.77% were with habit of cigarette smoking, diabetes mellitus, hypertension and chronic heart disease respectively. Among all the participants, in the highest number of patients S. aureus was associated as a single micro-organism. Moreover, MSSA (19%), S. epidermidis (26%) and MRSE (19%) were found among noticeable number of patients. Besides these, in some cases, E. coli, Peptostreptococcus, Propionibacterium spp., P. aeruginosa and P. mirabilis were found as responsible for surgical site infections.

Table 1: Age distribution of participants (N=47)

Age (Year)	n	%
18-30 Yrs.	8	17.02
31-50 Yrs.	28	59.58
>50 Yrs.	11	23.40

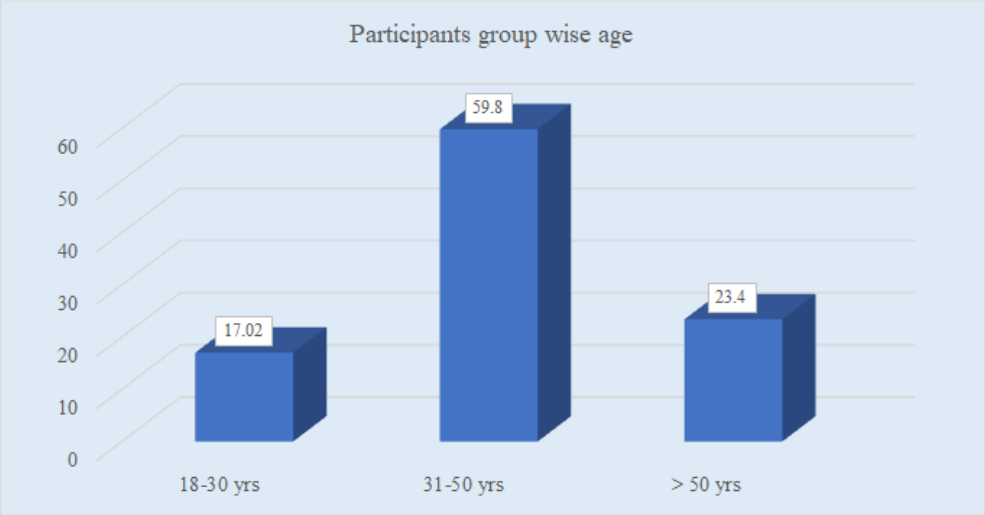

Figure 1: Participants age groups

Table 2: Types of SSI after posterior lumbar surgery among participants (N=47)

Incidence of SSI	n	%
Lumbar spinal stenosis	18	38.30
Lumbar spondylolisthesis	16	34.04
Lumbar disc herniation	10	21.28
Lumbar vertebral fracture	3	6.38

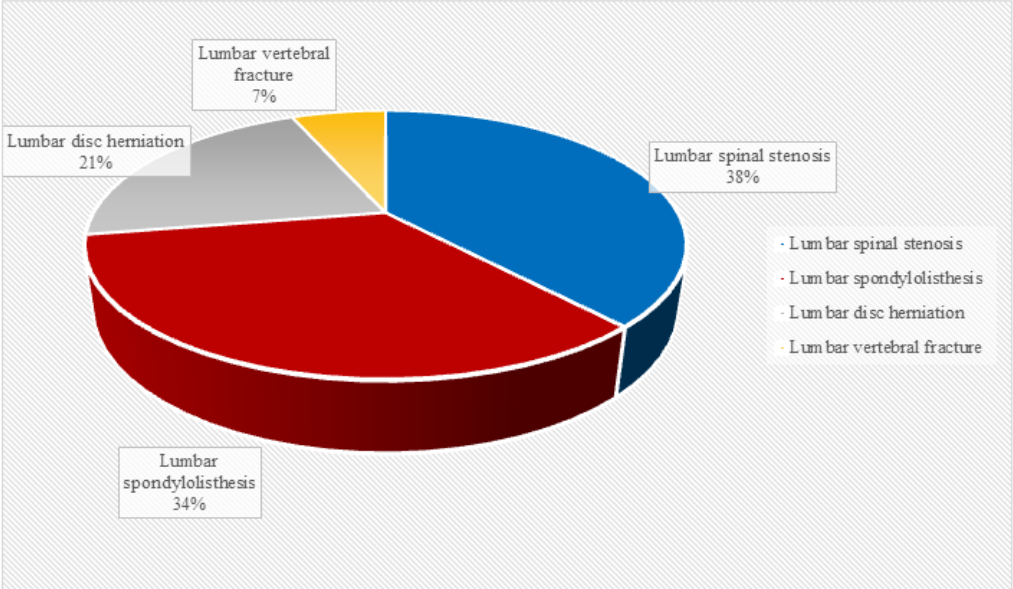

Figure 2: Types of SSI after posterior lumbar surgery among participants

Table 3: Comorbidity among participants (N=47)

Comorbidity	n	%
Obesity (≥28.0 kg/m2)	10	21.28
Cigarette smoking	6	12.77
Diabetes mellitus	9	19.15
Hypertension	8	17.02
Chronic heart disease	6	12.77
Cerebrovascular disease	5	10.64
Pulmonary disease	2	4.26
Chronic liver disease	3	6.38
Renal insufficiency	1	2.13

Table 4: Types of SSIs pathogens among participants (N=47)

Pathogens	n	%
S. Epidermidis	12	26.0
MSSA	9	19.0
MRSE	9	19.0

4. DISCUSSION

The aim of to this study was to determine the incidences of postoperative surgical site infection after lumbar spinal surgery and its several characteristics. In surgical practice, postoperative surgical site infection after lumbar spinal surgery is one of the most common complications. In this study, the highest number of participants was from 31-50 years' age group. Among total participants, 45% (n=21) were male and 55% (n=26) were female. So male-female ratio of the participants was 1:1.24. Among all the participants, among the highest number of patients S. aureus was associated as a single micro-organism. Besides these S. epidermidis (26%), MSSA (19%), and MRSE (19%) were found among noticeable number of patients. But in another study, it was found that, *S. epidermidis* is the most common causative organism of SSIs in patients, underwent lumbar or lumbosacral fusion [10]. In some studies it was claimed that, *Staphylococcus spp*. is capable of "rapid biofilm formation" on the surface of implanted implants that, nullifies the effectiveness of the antibiotic therapy [11, 12]. The studies that have been conducted on the characteristics of the formation of biofilms, depending on the material of the implants did not show significant differences [13]. In a study [14] by using the "binary logistic regression method", it was found that, "decompression-stabilizing surgical interventions" conducted at the low lumbar level significantly increased the risk of surgical site infections (SSIs). On the other hand, the prevalence of SSIs caused by gram-negative microflora was found 29.5%, and that fully agrees with the data from the "global literature" [15].

Limitation of the Study

This was a single centered study with a small sized sample. So, findings of this study may not reflect the exact scenario of the whole country.

5. CONCLUSION & RECOMMENDATION

The pre-assessment of microbiological characteristics should be done in all cases of surgical

site infections (SSIs) in patients after posterior lumbar spine fusions. Prompt application of antibiotics may reduce the complications in patients after posterior lumbar spine fusions. For getting more specific findings we would like to recommend for conducting similar more studies with larger sized samples in several places.

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