

Surgical Management in Elderly Patients with Tuberculous Spondylodiscitis: Ten Year Mortality Audit Study

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Study Design: Retrospective study.

Purpose: To evaluate the factors affecting immediate postoperative mortality in elderly patients with tuberculous spondylodiscitis.

Overview of Literature: Treatment of spinal tuberculosis in the elderly involves consideration of age and co-morbidities, and often leads to an extended conservative management. Surgical intervention in these patients becomes a complex decision. There are no studies on risk factors of mortality in surgically treated elderly with tuberculous spondylodiscitis.

Methods: Two hundred and seventy-six patients with spondylodiscitis were operated between 2005 and 2015. 20 consecutive patients over 70 years of age with and proven tuberculosis who met the inclusion/exclusion criteria were included. Demographic, clinical and radiological profile data with operative details of instrumentation, blood loss, surgical duration, and mortality were noted. There were 20 patients (6 males, 14 females) with a mean age of 73.5 years. The patients were divided into those with mortality (M) and those who survived (non-mortality, NM). Various variables were statistically tested for immediate postoperative medical complications and mortality.

Results: There were four mortalities (20%). Age, sex, number of medical co-morbidities, American Society of Anaesthesiologists grade, Frankel grade C or worse, number of vertebrae involved, number of levels fused, blood loss and operative time did not have statistically significant impact on immediate postoperative mortality. Only preoperative immobility duration was statistically higher in the M group ($p=0.016$) than in the NM group.

Conclusions: Preoperative immobility is associated with immediate postoperative mortality in elderly patients with spinal tuberculosis undergoing surgery. The findings identify preoperative immobility as a risk factor for mortality, which could contribute to a more detailed prognostic discussion between surgeon and patient before surgery.

Keywords: Spinal tuberculosis; Surgery; Elderly; Risk factors; Mortality

Introduction

As of 2010, there were 40 million elderly accounting for 13% of the population in the United States. This number is projected to increase to 72 million (20% of the popu-

lation) by 2030 [1]. Due to longer survival rates of the population, tuberculosis in the elderly is an emerging concern [2]. In 2013, India and China accounted for 35% of new cases [2]. The spine is the most common skeletal site [3]. Management of spinal tuberculosis in the elderly

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involves dealing with a compromised physiology, medical co morbidities and drug-drug interactions that often adversely affect treatment outcomes. Compared to younger individuals, the elderly individuals with tuberculosis are three times more at risk to develop drug reactions to medications, six times more likely to die of the disease and 20 times more likely have the diagnosis made after death [4].

Management of spinal tuberculosis is usually guided by the 'middle path' regimen [3]. Complete bed rest as a part of conservative treatment is frequently used in elderly patients in contrast to hip fractures, where mobilization of bed-ridden patients is a priority [5,6]. When conservative management fails, surgical options have to be considered. Surgery has its own morbidity and mortality risks. It is often long, requires an extended hospital stay, has greater blood loss and involves long segment fixation due to osteoporosis and degenerative spine. Revision rates and second surgeries are also reportedly higher in the elderly [7]. Risk factors for adverse outcomes for common surgeries like lumbar decompression in the elderly have been widely reported [8-13]. However, there is no data on the factors affecting immediate post operative mortality in the elderly with spinal tuberculosis.

Materials and Methods

Patients with tuberculous spondylodiscitis operated at our centre from 2005 to 2015 were identified. Inclusion criteria were age more than 70 years at the time of surgery, and tuberculosis proven by histopathology and or culture. Patients initially treated as tubercular but later found to be pyogenic on culture testing were excluded.

Of the 276 patients with spondylodiscitis, 20 consecutive patients met the inclusion/exclusion criteria. They comprised six males and 14 females with a mean age of 73.4 years (range 70 to 80 years). The institutional data retrieval system was used to collect the demographic and clinical data. Clinical data included spectrum of symptoms, duration of symptoms, number of co-morbidities and American Society of Anaesthesiologists (ASA) grade. Duration of preoperative immobility (with or without neurological deficit) was also noted. Neurology was assessed using the Frankel grading system.

Indications for surgery were failure of conservative management, progressive neurodeficit or profound neurodeficit on presentation and gross spinal instability. All patients underwent posterior instrumentation and

decompression, except one patient who underwent only decompression and another patient who underwent uninstrumented C2-3 anterior cervical discectomy and fusion with iliac crest bone graft.

The surgical details included blood loss, operative time, instrumentation type and number of levels included in the fusion. Active and passive exercises were started immediately postoperatively as tolerated. Efforts aimed at mobility were begun once patients were medically stable. Anti-tubercular drugs started postoperatively. A record of postoperative medical complications was made. All the patients were followed up for 30 days postoperatively. The histopathology and culture/sensitivity reports were examined for any tuberculosis resistant strains. None of the patients undergoing surgery had resistant tuberculosis. We statistically tested these parameters between patients with mortality (M group) and patients with non-mortality (NM group). Mann Whitney U test and Fisher Exact test were used for statistical analyses using SPSS ver. 16 for Windows (SPSS, Chicago, IL, USA).

Results

Details of the patients with mortality are presented in Table 1. The mean age was similar in the M and NM groups with overall value being 73.4 years. Females constituted 75% of patients in the M group versus 68.7% in the NM group. This difference was not statistically significant. The thoracolumbar junction was the most common site involved. The most common complaint was localised back pain. Leg pain was present in patients involving lower lumbar levels. Constitutional symptoms were present in two patients. There were 5 patients with three or more contiguous vertebrae involved. Average number of vertebrae involved was 2.5 with no significant difference amongst the two groups. Preoperative immobility was observed in 12 patients. The mean duration of preoperative immobility in the M group was 72 days in contrast to 11.5 days in the NM group ($p=0.016$). There were 14 patients with neurological deficit; 10 had Frankel grade C or less and three patients had Frankel grade D. The M group had higher proportion of patients with Frankel C or less neurology as compared to patients who survived. However, the difference was not statistically significant ($p=0.58$). Following the same trend, there was no statistical difference in ASA grade and number of co-morbidities. The mean ASA grade in patients with M and NM groups was

Table 1. Comparison of M vs. NM groups

Parameters	M group (n=4)	NM group ^{a)} (n=16)	<i>p</i> -value ^{b)}
Mean age (yr)	72.5	73.6	0.75
Female sex	3	11	0.657 ^{c)}
Co-morbidities ^{d)}	2.75	1.81	0.335
ASA grade	2.5	2.31	0.820
Frankel C or less	3	7	0.582 ^{c)}
Preoperative immobility duration ^{d)}	72.5	11.56	0.016 ^{c)}
Levels involved	1.25	1.5	0.820
No. of levels fused	4.75	5.9	0.494
Blood loss (mL)	675	535	0.554
Operative time (min)	191	147	0.122

M, mortality; NM, non-mortality; ASA, American Society of Anaesthesiologists.

^{a)}Includes patients with postoperative complications but survived; ^{b)}Mann Whitney U test except; ^{c)}Fisher exact test; ^{d)}Values in mean.

2.5 and 2.31, respectively. The mean overall ASA grade and number of co morbidities was 2.35 and 2, respectively. An average of 5.7 vertebrae was included in the fusion per patient. The mean number of vertebral levels included in the surgical fusion in the NM group was higher than in the M, however not leading statistical significance. Although the mean blood loss and operative time was higher in the M group than in the NM group, the difference was not statistically significant.

Discussion

Tuberculosis is a globally prevalent infectious disease. Tuberculosis commonly affects the young. However, due to the aging population the incidence of disease in the elderly is on the rise [14]. Age, frailty and co-morbid conditions lead to apprehension about the risks of surgery for the surgeon as well as the caretakers. This study focuses specifically on this age group. The mean age was 73.4 years.

Conservative management is commonly the first step of management in this situation. An et al. [15] studied the clinical characteristics of elderly patients with spine tuberculosis who were conservatively managed. They reported 35 of 36 patients healed with chemotherapy. Only one required surgery due to worsening symptoms. Overall they found satisfactory results with conservative management. Failure of conservative management requires surgical intervention. In the elderly this surgical consideration requires a multidisciplinary involvement due to medical

co morbidities. Complications are common in the elderly. Even same-day procedures like lumbar decompression surgery in the elderly have been reported to have a complication rate of 35% [11]. In a national registry data of patients undergoing spine surgery, Schoenfeld et al. [16] reported that female sex, longer operative time and medical co-morbidities as risk factors for complications or mortality. The mean age in their study was 55 years as compared to 73 years presently. In the present study, we did not find these factors to be significant as explained below. Concerning pyogenic lumbar spondylodiscitis, Hempelmann et al. [17] reported a mortality rate of 17% in elderly patients undergoing surgery. However, pyogenic spinal infections are usually seen in the severely immunocompromised and morbid patients. On the other hand, Zhang et al. [18] compared the surgical results of combined anterior plus posterior surgery versus only posterior surgery in thoracic spine tuberculosis in the elderly, and noted complications in both the groups, with no mortality reported. On comparison of their 'posterior only' group with that of this study, we had a high incidence of mortality. Tuli [19] reported 12% mortality in patients with spinal tuberculosis who underwent surgery due to failure of conservative management. Their study included all age groups, which could explain the slightly lower mortality than in the present study (20%). Although they did not study the risk factors of mortality, there was a common aspect of preoperative bed rest/immobility in both the studies.

In the present study preoperative immobility duration

was the only statistically significant variable. Complete bed-rest forms a part of the 'middle path' regime [19] which is widely followed. In the younger population, prolonged periods of rest with chemotherapy are well tolerated, with satisfactory results even with significant neurological deficits [19]. This protocol is conveniently extended to the elderly too, partly because surgery is actively avoided by the caretakers as well as the treating physicians, in view of advanced age and multiple co morbidities. In such a scenario, conservative management is usually prolonged beyond its use. When this conservative management fails, there is little option but to offer surgery. In these patients the toll of immobility goes unaccounted for. If the patient has had medical complications while on bed rest, the overall risks of surgical intervention are anticipated by the surgeons as well as care givers. But, some of the patients who have a medically uneventful bed rest period, the anaesthesia fitness appear within reasonable risk limits in this desperate scenario. The adverse effects of bed rest in the elderly are well known [20,21]. Prolonged bed rest has systemic as well as musculoskeletal deconditioning after as early as a week in the young [20]. In the present study, the mean duration of preoperative immobility in the M group was 72 days as compared to 8 days in the NM group. Taking an example from hip fractures, conservative treatment of hip fractures greatly increases the risk of mortality and morbidity [22,23]. On the other hand, several studies on hip fractures have shown that delay to surgery of more than two days is associated with increased immediate major complications, increased 30 day mortality and one-year mortality [5,6,24]. Thus, based on our data, it appears that surgery may be warranted when mobility is threatened. Conservative management may be restricted to the ambulatory patient.

There are some limitations of this study. The sample size was restricted due to the fact that it was an uncommon age group to undergo surgery for spinal tuberculosis. Also, we could not quantify the period of safe bed rest. Many other factors identified as independent risk factors for complications and mortality were not significantly different in this study. This was largely due to a highly selective cohort of patients. Age was similar in both the groups and there was a strong female preponderance, leading to non significant statistical tests. Similarly, ASA grade and Frankel grade was similar in most patients. Most of the patients underwent the same kind of surgery and thus had similar operative time, blood loss and levels fused. Given

the appropriate control group probably these factors would also be significant as shown by other studies [16]. In addition we did not study other risk factors like blood counts and serum albumin levels.

Conclusions

Frailty scoring [25] is an emerging concept that needs attention in the elderly patients undergoing spine surgery. This study serves to identify preoperative immobility as a risk factor for mortality which allows the surgeon to have a detailed prognostic discussion before surgery in this situation. Further studies are required to determine the risks of bed rest versus the risks of surgery in this elderly population, for a complete picture.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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