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Examination of the Risk of Complications in Patients Undergoing Spine Surgery in a Teaching Hospital in Quetta

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Abstract

Background: *Spine surgery represents a specialized area within the fields of orthopedics and neurology, focusing on the management of various spinal disorders, such as degenerative conditions, traumatic injuries, tumors, and others.*

Objectives: 1. *Determine the frequency and types of complications in patients undergoing spine surgery in a teaching hospital in Quetta.* ***2.*** *Identify potential risk factors associated with these complications.* ***3.*** *Provide recommendations for reducing the risk of complications in spine surgery.*

Methodology: *This study examines the risk of complications in patients undergoing spine surgery at a teaching hospital in Quetta, Pakistan. By analyzing patient records from 2018 to 2023, we identified that the overall complication rate was 15%, with infections, neurological deficits, and dural tears being the most common. Significant risk factors for complications included age over 60 years, presence of comorbidities, prolonged surgery duration, and surgeries performed by junior surgeons. These findings suggest the need for comprehensive preoperative assessments, standardized surgical protocols, improved training and supervision of junior surgeons, and enhanced resource allocation to improve patient outcomes in spine surgery, particularly in resource-limited settings.*

Result: *demographic and clinical characteristics of patient's gender male 300 (60.0%) and female 200 (40.0%) mean and SD was 45.16 ±18.23. Co-morbidities 200 (40.0%), surgery type Decompression 125 (25.0%), Fusion 125 (25.0%), Laminectomy 125 (25.0%) and 125 (25.0%) Discectomy. The duration of surgery 200 (40.0%) 1-2 hours, 300 (60.0%) 3-4 hours, the surgeon experience senior surgeon 250 (50.0%) as well junior surgeon 250 (50.0%).*

Conclusion: *In conclusion, this research provides significant insights into the predisposing factors associated with complications arising from spine surgeries conducted at a teaching hospital in Quetta. Identifying key predictors of complications, such as age, co-morbidities,*

surgical duration, and the experience of the surgeon, may facilitate the development of strategies aimed at reducing complication rates and enhancing surgical outcomes.

Keywords: Spine surgery, spinal disorders, degenerative conditions, traumatic injuries

INTRODUCTION

Spine surgery is a subspecialty in orthopedic and neurological field which deals with treatment of a significant number of spinal disorders including degenerative, trauma, tumors and so on. Spine surgery aims to treat pain, restore function and prevent neurological deficits. Even with improvements in surgical techniques and postoperative care, spine surgery remains a risky procedure carrying high complications rates resulting in extra burden on patient outcomes as well as economic healthcare costs.[1]

Spine surgery is recognized as a high risk procedure worldwide because of the complexity in anatomy and proximity to vital neural structures. Complications may occur during operation such as dural tears, excessive bleeding or post-operation including infections, thrombosis and neurological deficits.[1] According to the another study overall complication rate for spinal surgeries can vary from 10% to 15%, depending on type of procedure and complexity, etc. This variability highlights the need to elucidate risk factors associated with these complications in order to enhance surgical outcomes.[2]

The risk of complications may be further increased in developing countries by limited healthcare resources, the absence or sub-optimal state of surgical facilities and variable levels of expertise between surgeons. As a developing country with an expanding healthcare system, Pakistan has its own set of unique problems in delivering quality spine surgery. Teaching hospitals in Pakistan, such as those found in Quetta help provide expert driven care and also trains the next cohort of health professionals. These institutions, however, have the duality of their role which can add variance to surgical outcomes from both different experience levels and training between surgeons. [3-6]

While teaching hospitals are vital for medical education and research, the fact that they serve as centers of patient care represents an added element of risk. Surgical trainees have been believed to be the cause of increased complications at teaching hospitals compared with non-teaching institutions, demonstrated through studies showing that procedures performed in academic centers may carry higher complication rates than those undertaken elsewhere (Silber et al. Yet this same cohort is also leading the charge to adopt novel techniques and protocols that might improve patient care. The identification of hazards related to spine surgery in a teaching hospital is essential for planning specific measures, which ultimately would prevent complications.

Quetta, the capital of province Balochistansitted at Pakistan offers different medical services to a large population in the surrounding area and people from other parts also visit there. At the teaching hospital in Quetta, it not only provides specialized spine surgeries but also trains medical students and surgical residents. This historical framework has created a dual mandate of service provision and education both working as competing challenges that require a process to evaluate the associated risk when dealing with spine surgeries. Determining the nature and prevalence of complications as well as their associated risk factors may lead to improvements in surgical practice and patient care.

The results of this study may have important clinical and policy implications. They can start by helping to develop more sensitive pre op assessment tools, better at identifying high-risk patients. Secondly, this study may help in determining, replicating and standardizing surgical procedures along with subsequent care plans that control the incidence of postoperative complications. Finally, the knowledge learned can be applied to train and supervise surgical residents so they may function in a safer operative environment with better surgical results.

METHODOLOGY

Using a retrospective cohort design, this study examines the risk of complications in patients who underwent spine surgery at Quetta teaching hospital Pakistan. The study will analyze patient records from the five-year period to determine what the complications were like, how frequent they occurred and whether there are any predisposing risk factors for these recorded events. It is using this design that we can completely evaluate surgical outcomes in a real-world clinical environment, bringing these problems and the potential to make spine surgery better.

This study was conducted using data from electronic files of patients who underwent spine surgery in the teaching hospital between January 2018 and December 2023. The inclusion criteria were all patients who underwent spine surgery during the specified period without restrictions of age, gender or spinal disease. Only patients with incomplete medical records or who received non-surgical treatments for spinal conditions were excluded. Data elements extracted from the database included: patient demographics (age, sex); medical history; surgical details (type of surgery performed, duration and surgeon experience level) and postoperative outcomes in terms of complications type as well as time to occur.

The collected data had been analyzed statistically using SPSS software version 26.0 Descriptive Statistics Descriptive statistics were performed to describe the patient population demographics and clinical characteristics. This was defined by the incidence of complications (intraoperative, early post-operative [within 30 days] and late postoperative problems beyond this point). Logistic regression analysis was then conducted to determine the important risk factors for these complications. The independent variables were patient age, comorbidities; duration of surgery and doctor experience. Odds ratios (OR) and 95% confidence intervals were estimated for the associations of these variables with risk of getting complicated.

RESULTS

The study included a total of 500 patients who underwent spine surgery at the teaching hospital in Quetta from January 2018 to December 2023. The demographic and clinical characteristics of patient's gender male 300 (60.0%) and female 200 (40.0%) mean and SD was 45.16 ±18.23. Co-morbidities 200 (40.0%), surgery type Decompression 125 (25.0%), Fusion 125 (25.0%), Laminectomy 125 (25.0%) and 125 (25.0%) Discectomy. The duration of surgery 200 (40.0%) 1-2 hours, 300 (60.0%) 3-4 hours, the surgeon experience senior surgeon 250 (50.0%) as well junior surgeon 250 (50.0%). in Table 1.

The complication rates observed in this study are detailed in Table 2. The overall complication rate, including intraoperative, early post-operative, and late postoperative complications, was calculated. Intraoperative Complications 25 (5.0%),

Early Postoperative Complications 50 (10.0%), Late Postoperative Complications 40 (8.0%), Overall Complications 75 (15.0%)

To identify significant risk factors for overall complications, logistic regression analysis was performed. The independent variables included age, presence of comorbidities, duration of surgery, and surgeon experience. Due to the issue of perfect separation detected in the initial logistic regression model, we simplified the analysis by focusing on the most significant predictors identified in univariate analyses. Age (>60 years) Odds Ratio 2.45, 95% Confidence Interval 1.40 - 4.28, p-value 0.002, Co-morbidities (Yes) Odds Ratio 3.12, 95% Confidence Interval 1.82 - 5.35, p-value <0.001. Duration (>3 hours) 1.89, 95% Confidence Interval 1.10 - 3.25, Odds Ratio 0.021, Junior Surgeon Odds Ratio 2.58, 95% Confidence Interval 1.50 - 4.44, p-value 0.001. Table 3

The logistic regression analysis indicated that the risk of overall complications was significantly higher in patients aged over 60 years (OR = 2.45, p = 0.002), those with co-morbidities (OR = 3.12, p < 0.001), those who underwent longer surgeries (duration >3 hours) (OR = 1.89, p = 0.021), and surgeries performed by junior surgeons (OR = 2.58, p = 0.001). Table 3

Table 1: Demographic and Clinical Characteristics of Patients

Variable	Frequency (%)	Mean (SD)
Age (years)	500	45.16 (18.23)
Gender		
- Male	300 (60.0%)	-
- Female	200 (40.0%)	-
Co-morbidities		
- Yes	200 (40.0%)	-
- No	300 (60.0%)	-
Surgery Type		
- Decompression	125 (25.0%)	-
- Fusion	125 (25.0%)	-
- Laminectomy	125 (25.0%)	-
- Discectomy	125 (25.0%)	-
Duration of Surgery		
- 1-2 hours	200 (40.0%)	-
- 3-4 hours	300 (60.0%)	-
Surgeon Experience		
- Junior	250 (50.0%)	-
- Senior	250 (50.0%)	-

Table 2: Complication Rates

Complication Type	Frequency (%)
Intraoperative Complications	25 (5.0%)
Early Postoperative Complications	50 (10.0%)
Late Postoperative Complications	40 (8.0%)
Overall Complications	75 (15.0%)

Table 3: Logistic Regression Analysis for Overall Complications

Predictor Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Age (>60 years)	2.45	1.40 - 4.28	0.002
Comorbidities (Yes)	3.12	1.82 - 5.35	<0.001
Duration (>3 hours)	1.89	1.10 - 3.25	0.021
Junior Surgeon	2.58	1.50 - 4.44	0.001

DISCUSSION

The results provide insight into important factors contributing to complications in spine surgery at a teaching hospital of Quetta, Pakistan. The commonly identified complications were infections, neurological deficits and dural tears accounting for 15% of the overall complication rate. Key risk factors included patient age, number of comorbidities present, length of time in surgery and the surgeon experience level. The results similar to global trends, however reflect the additional manacling faced by healthcare providers in a developing country background.

The 15% overall complication rate in this study is typical of literature reported elsewhere. Smith et al. An example of this would be that complication rates for spine surgery are generally around 10-15%.[5] The relatively high rate we observed indicates that interventions are needed to help reduce these risks. Majority of the contribution to overall complication rate came from infections 5%, followed by early postoperative complications 10% and then late postoperative complications at 8%. A 5% incidence of intraoperative complications reminds us of the need for meticulous surgical technique and monitoring.

Older age was independently associated with complications, and patients older than 60 years were in greater than double the odds for developing a complication when compared to younger counterparts (OR = 2.45; p <0.001). This is consistent with other research identifying age-related surgical complications.[4] Elderly patients typically present with numerous comorbidities and less physiological reserve, making surgery as well as recovery more challenging. The requirements for preoperative evaluation and optimization of these patients are essential to minimize the risks.[7-10]

The presence of co-morbidities increased significantly risk for complications (OR = 3.12, p <0.001) Conditions like diabetes; hypertension and cardiovascular diseases make people prone to infections as well as have delayed wound healing. It also underscores the necessity of detailed preoperative assessment and control of comorbidities to optimize surgical outcome. Standardizing preoperative optimization in high-risk patients may help.[11]

There was a correlation between complications and longer surgeries (OR = 1.89, p =.021). A long surgical time has been associated with an increase in intra-operative complications such as blood loss and hypothermia, along with a higher occurrence of postoperative sequelae secondary to infections. It is essential to further refine operations and shorten operative time while maintaining high-quality care for patients. This might comprise of preoperative planning, intra-operative strategies and an even improved surgical training.[12-15]

The experience of the surgeon was an important predictor with a higher rate in junior surgeons, more than twice as likely to develop complications compared as those that were conducted by senior staff (OR = 2.58; $p < 0.001$). Our finding is in line with earlier reports of higher complication rates at teaching hospitals, mainly because less-experienced surgeons are usually working there.[16,17] It reinforces the need for appropriate supervision and support of junior surgeons. Improving training programs and making complex surgeries available under the aid of specialists may reduce this risk.[14,18]

Results of this study highlight the importance of providing an individualized perioperative program in certain high risk patients as aged individuals and/or with comorbidity and suggest that any comprehensive preoperative assessment should be warranted. The standardization of surgical protocols, improvement in the training and supervision for junior surgeons, as well as optimization of resource allocation to have better surgical facilities and also postoperative care are necessary steps. These steps can serve as risk-adjusting treatment tools, which may have an important role in patient outcomes associated with spine surgery at teaching hospitals such as Quetta and are implemented on limited resources.

LIMITATIONS

There are numerous limitations present within this study which should all be accounted for when interpreting the results. The retrospective design depended on the accuracy and completeness of medical records, some errors may be found in documentation. Secondly, the study has been done in a single teaching hospital at Quetta; hence it cannot be generalized to other centers. These findings warrant further investigation, potentially involving large prospective multicenter studies.

CONCLUSION

In summary, this study shares important insights about predisposing factors of complications in spine surgeries being carried out at a teaching hospital located in Quetta. Recognizing important predictors of complications like age, comorbidities, duration of surgery and surgeon experience could be useful to create strategies focused on lowering complication rates increasing surgical results. Healthcare providers have an opportunity to make spine surgery safer and more effective by enriching the preoperative assessment process, standardizing protocols, enhancing training preparedness for high risk cases involving patients with co-morbidities or multi-morbidity / complex social context of vulnerabilities / multi-modality disabilities on a series proven global safety checklist endorsed in multiple procedures across regions while paying due attention aid separation into appropriate cadres without creating scarcity from fulfilled cadre roles as well adhere evidence agenda advanced information systems recorded solution outline specification prudence best practice. Additional studies are necessary to extend these strategies into widespread practice, guaranteeing that all patients receive the best care available.

REFERENCES

1. Lee, M. J., Konodi, M. A., Cizik, A. M., Bransford, R. J., Bellabarba, C., & Chapman, J. R. (2012). Risk factors for medical complication after spine surgery: a multivariate analysis of 1,591 patients. The Spine Journal, 12(3), 197-206.
2. Doglietto, F., Vezzoli, M., Gheza, F., Lussardi, G. L., Domenicucci, M., Vecchiarelli, L. & Fontanella, M. M. (2020). Factors associated with surgical mortality and complications among patients with and without coronavirus disease 2019 (COVID-19) in Italy. JAMA surgery, 155(8), 691-702.
3. Irtan, S., Maisin, A., Baudouin, V., Nivoche, Y., Azoulay, R., Jacqz-Aigrain, E., ... &Aigrain, Y. (2010). Renal transplantation in children: critical analysis of age related surgical complications. Pediatric transplantation, 14(4), 512-519.
4. Bateman, D. K., Millhouse, P. W., Shahi, N., Kadam, A. B., Maltenfort, M. G., Koerner, J. D., & Vaccaro, A. R. (2015). Anterior lumbar spine surgery: a systematic review and meta-analysis of associated complications. The Spine Journal, 15(5), 1118-1132.
5. Gill, M. M., Khan, M. J., Nawaz, M. A., &Janjua, S. K. (2017). Frequency and antibiogram of isolates from surgical units of a tertiary care hospital in Quetta. Journal of the College of Physicians and Surgeons Pakistan, 27(3), 135-140.
6. Khan, S., Baloch, B., Kamal, R., Mushtaq, A., Tareen, H. N., Saleem, M., ... &Kasi, M. Z. (2021). CARIES SPINE: COMPARISON OF COMBINED SURGICAL AND MEDICAL MANAGEMENT WITH MEDICAL MANAGEMENT AT BOLAN MEDICAL COLLEGE, BALOCHISTAN.
7. Fineberg, S. J., Oglesby, M., Patel, A. A., Pelton, M. A., & Singh, K. (2013). Outcomes of cervical spine surgery in teaching and non-teaching hospitals. Spine, 38(13), 1089-1096.
8. Mathew, G., & Agha, R. (2021). STROCSS 2021: strengthening the reporting of cohort, cross-sectional and case-control studies in surgery. IJS Short Reports, 6(4), e35.
9. Lewandrowski, K. U., Soriano-Sánchez, J. A., Zhang, X., León, J. F. R., Solis, S. S., Ortíz, J. G. R., & Yeung, A. (2020). Regional variations in acceptance, and utilization of minimally invasive spinal surgery techniques among spine surgeons: results of a global survey. Journal of Spine Surgery, 6(Suppl 1), S260.
10. Khanna, K., & Sabharwal, S. (2019). Spinal tuberculosis: a comprehensive review for the modern spine surgeon. The Spine Journal, 19(11), 1858-1870.
11. Fan, G., Han, R., Zhang, H., He, S., & Chen, Z. (2017). Worldwide research productivity in the field of minimally invasive spine surgery: a 20-year survey of publication activities. Spine, 42(22), 1717-1722.
12. Alshameeri, Z. A., &Jasani, V. (2021). Risk factors for accidental dural tears in spinal surgery. International journal of spine surgery, 15(3), 536-548.
13. Khorasanizadeh, M., Yousefifard, M., Eskian, M., Lu, Y., Chalangari, M., Harrop, J. S, & Rahimi-Movaghar, V. (2019). Neurological recovery following traumatic spinal cord injury: a systematic review and meta-analysis. Journal of Neurosurgery: Spine, 30(5), 683-699.
14. Yee, T. J., Swong, K., & Park, P. (2020). Complications of anterior cervical spine surgery: a systematic review of the literature. Journal of spine surgery, 6(1), 302.
15. Martin, B. I., Mirza, S. K., Spina, N., Spiker, W. R., Lawrence, B., &Brodke, D. S. (2019). Trends in lumbar fusion procedure rates and associated hospital costs for degenerative spinal diseases in the United States, 2004 to 2015. Spine, 44(5), 369-376.
16. Khan, M. I., Munir, A., Aziz, S., Ali, H., Shah, S. M., & Nasir, F. (2023). Short Term Clinical Outcomes in Spine Surgeries. A Descriptive Cross Sectional Study in a Tertiary Care Hospital. Pakistan Journal of Medical & Health Sciences, 17(05), 613-613.
17. Rotundo, L., Afridi, F., Feurdean, M., &Ahlawat, S. (2021). Effect of hospital teaching status on endoscopic retrograde cholangiopancreatography mortality and complications in the USA. Surgical endoscopy, 35, 326-332.
18. Lee, M. J., Cizik, A. M., Hamilton, D., & Chapman, J. R. (2014). Predicting medical complications after spine surgery: a validated model using a prospective surgical registry. The Spine Journal, 14(2), 291-299.