Single-Surgeon Extensile Approach And Fixation Of Thoraco-Lumbar Pathology: Review Of Our Experience.

N Motsitsi

Citation

N Motsitsi. *Single-Surgeon Extensile Approach And Fixation Of Thoraco-Lumbar Pathology: Review Of Our Experience.*. The Internet Journal of Spine Surgery. 2009 Volume 5 Number 2.

Abstract

Extensile approaches to the thoracic and lumbar spine are required for tumours, fractures, malignancies, deformity corrections and degenerative diseases. The body cavities (thorax and abdomen) require different approaches depending on the primary pathology and the desired exposure plus fixation method. There is usually two teams involved: the 'exposure surgeon' and the 'operating surgeon'. Such a team is usually not feasible in developing countries. The purpose of this paper is to find out whether it is safe for a single surgeon to do both the exposure and the operation. Nineteen patients operated on by a single surgeon over a three-year period were reviewed. This is a retrospective study. The information was obtained from clinical records. There were 10 females and 9 males, all below the age of 60 years. Four cases were due to infection, 14 due to trauma and 1 due to metastasis. The approach was dictated to by the pathology. The approaches were thoracotomy in 5, trans-thoracic trans-diaphragmatic retroperitoneal in 5 and 12th rib sub costal retroperitoneal in 9. There were 4 intra-operative and 1 post-operative significant complications. All were managed successfully. An experienced spinal surgeon can safely do both the approach and operative intervention. The complications can be safely managed. There is no increase in the complication rate.

INTRODUCTION

Extensile exposures to the thoraco-lumbar spine is indicated in trauma, infection, degenerative disease, tumours and deformities. The type of exposure depends on the location of the pathology and the extend of the accessibility required. The approach may be transthoracic (thoracotomy), transthoracic-transdiaphragmatic and retroperitoneal (TTTDRP) or sub diaphragmatic retroperitoneal (12th rib sub diaphragmatic RP). These are technically difficult and potentially dangerous approaches. The learning curve is also very steep.

In most developed countries, there is a team made up of 'exposure surgeons' and 'operating surgeons'. The former will generally be either general or vascular surgeons and the latter will either be spinal orthopaedic or neurosurgeons. The 'exposure surgeons' are considered suitable for this surgery because of their unique knowledge of the area and the retroperitoneal structures.[1] There may also be a 'dedicated team' for such extensive operations.[2]

The availability of such a team is rare in developing countries. The number of patients who need such an expertise or service is very large. The available surgeon must simply be so versatile as to act as both the 'exposure' and 'operating' surgeon if he is to be of value to the community. This is a huge undertaking for a single surgeon.

The purpose of this paper is to find out whether there is an increase in the complication rate when a single surgeon does both the exposure and the surgery. The surgical techniques and the approaches described are not novel. The author does not specifically focus on the outcome of the operative procedures per se.

MATERIALS AND METHODS

Setting: the work was done at a secondary (about 800 beds) hospital affiliated to the tertiary institution.

Subjects: all patients treated from March 2006 up to June 2009. They were all operated by the author.

Type of study: retrospective study. The information was collected prospectively using a pro-forma. No IRB approval is needed for review of retrospective studies. The demographic data, primary pathology, surgical approach, type of operation and the complications are illustrated in the accompanying table.

RESULTS

There were 19 patients with an average age of 37 years (

range: 14 - 55 years). There were 10 females and 9 males. The pathology was: trauma (n = 14), infection (n = 4) and metastasis (n =1). The position during surgery was right lateral decubitus (in all) plus prone in those who needed additional transpedicular screw fixation. The approach was from the left side. Five patients needed thoracotomy (Table 1)

Figure 1

Table 1: The table indicates demographic data, pathology, approaches, type of surgery and complications in 19 patients

No	Sex	Age (years)	Pathology	Approach	Procedure	Follow-up (months)
1	F	55	TB: T12-L1	10th rib Thoracotomy TTTDRP	T12-L1 corpectomy + AI	13
2	M	14	TB: T2-T4	Thoracotomy via 6th rib	T2-T3 corpectomy + AI	6
3	M	45	Compression # T11 T12 + Burst L1	10th rib TTTDRP	Corpectomy L1 partial T12 AI	24
4	F	43	Compression # T11 / T12	10th rib TTTDRP	T11-T12 corpectomy + AI	24
5	F	40	TB T9-T10	8th rib Thoracotomy	T9-T10 corpectomy + AI	24
6	F	35	Burst # T4 & T9, Compression # T5	4th rib Thoracotomy	T4 / T5 corpectomy + AI	6
7	M	26	Traumatic disc prolapse T8 / T9	9th rib Thoracotomy	T8 / T9 discectomy + AI	7
8	F	49	Ca. Thyroid T8 / T9	7th rib Thoracotomy	T8-T9 corpectomy + AI	3
9	F	37	TB T12 – L1	10th rib TTTDRP	Posterior = Pedicular screws. Anterior = T12-L1 corpectomy + AI	30
10	F	47	Burst # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	8
11	M	33	Chance # T12	10th rib TTTDRP	T12 corpectomy + AI	3
12	F	32	Compression # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	24
13	M	36	Burst # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	3
14	F	17	Burst # L1	12th rib subdiaphragmatic RP	L1corpectomy + AI	1
15	M	32	Burst # L2	12th rib subdiaphragmatic RP	Posterior = Pedicular screws L1+L3. Anterior = corpectomy L2 + AI	14
16	F	40	Old # - dislocation: Compression # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	3
17	M	50	Compression # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	12
18	M	39	Burst # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	1
19	M	24	Burst # L1	12th rib subdiaphragmatic RP	L1 corpectomy + AI	21

Abbreviations: # = Fracture(s), TTTDRP = Trans thoracic trans-diaphragmatic and retroperitoneal, RP = Retroperitoneal and

AI = Anterior instrumentation.

Table 1: shows demographics of the patients, the pathology, surgical approach and complications.

, five TTTDRP and nine 12th rib sub diaphragmatic RP. All cases had corpectomy plus anterior instrumentation. Patients 9 and 15 needed additional posterior transpedicular screw fixation. The former had simultaneous anterior and posterior procedure and the latter had a staged operation . The average duration for the operation was 3.0 hours (range: 2.5 - 3.5 hours) for anterior procedures. The patient who needed anterior plus posterior procedure during the same anaesthesia took 5.5 hours. The average blood loss was 600 millilitres(ml) (range 300 - 900ml). Patient 9 had the highest blood loss: 1500ml.

All patients were admitted to the high-care unit post-operatively. The average stay in high-care was about 4 days (range 3- 5 days). There were no intra-operative or immediate post - operative mortality. No patient needed revision surgery either because of technical complications or implant problems.

Significant complications were recorded in all cases. These are complications that either needed corrective actions during the operation or the complications affected the course of the final event. There were five significant complications: four were intra-operative (2 pneumothoraces, one diaphragmatic and pleural tears and one fracture of the vertebra during internal fixation) and one post-operative (sepsis of bone-graft donor area). All were managed successfully. The follow-up was, on average, 11 months (range 1 - 30 months).

DISCUSSION

A single surgeon can safely do both the extensile exposure and operative intervention. The complication rate is fairly low and is not higher than those reported in the literature. The types of complications, though significant, were fairly easy to handle and did not affect the final outcome. It should always be borne in mind that both the exposure and the operation are technically very demanding and dangerous.

Very few spinal surgeons perform these spinal procedures independently .[3] Holt Richard et al. reviewed 450 patients done by a single spinal surgeon for deformity corrections, fractures, tumours, infections and degenerative disease of the spine. They concluded that the complication rate is lower.[3]

Thoraco-lumbar procedures have a high complication rate: may reach up to 31%.[1,4] Major complications may be up to 11%.[4,5] Antero-lateral approach via the left side has a very low complication because all major structures are under direct vision.[6] Up to 50% of patients who had thoracotomy experience pulmonary complications.[7] Anterior and posterior procedures (360 spinal operation) during the same anaesthesia carries a higher complication rate.[8] A staged procedure in this case has a lower complication rate. Staged procedure is safe, has low blood loss and is reliable.[9] The availability of two surgical team in such cases is an important factor in the success of the procedure.[10] Such a team maximizes available surgical skills and therefore decreases the complication rate.[11]

The limitations of the study are: retrospective in nature, few patients and there is no comparative group.

CONCLUSION

A well-trained and experienced spinal surgeon can safely do the approach and surgery of the thoraco-lumbar pathology. The complication rate is acceptable.

References

1. Chiriano Jason D O, Abou-Zamzam Ahmed M. Jr, Urayeneza Olivier B S, Zhang Wayne W, and Cheng Wayne. The role of the vascular surgeon in anterior retroperitoneal spine exposure: Preservation of open surgical training. Journal of Vascular Surgery. 50(1): 148 - 151, July 2009.
2. Luke Brewster, Nathan Trueger, Carol Schemer, Alex Ghanayem and John Santaniello. World J. Surg (2008) 32: 1414 – 1419. Infraumbilical Anterior Retroperitoneal Exposure of the Lumbar Spine in 128 Consecutive Patients.
3. Holt Richard T., Majd Mohammad E., Vadhva Mukta and Castro Frank. The Efficacy of Anterior Spine Exposure by an Orthopedic Surgeon. Journal of Spinal Disorder and Techniques. Volume 16(5), October 2003, pp 477 - 486.
4. Dimar John R. III, Puno Rolando M. and Johnson John R. Perioperative Complications of Anterior Procedures on the Spine. JBJS. Volume 78-A(6), June 1996, pp 839 - 847.
5. Knop C., Bastian L., Lange U., Oeser M., Zdichavsky M. and Blauth M. Complications in surgical treatment of Thoracolumbar injuries. Eur Spine J (2002) 11: 214 - 226.
6. Inamasu J. and Guiot B. H. Vascular injury and complication in neurosurgical spine surgery. Acta Neurochir (Wien) (2006) 148: 375 – 387.
7. McAfee Paul C. Complications of Anterior Approaches to the Thoracolumbar Spine. Clinical Orthopedics and Related Research, Number 306, September, 1994. pp 110 - 119.
8. Snell Brian E., Nasr Fadi F. and Wolfla. Single-stage Thoracolumbar vertebrectomy with circumferential reconstruction and arthrodesis: surgical technique and results in patients. Operative Neurosurgery 2, Volume 58: April 2006.
9. Payer M. Unstable burst fractures of the thoraco-lumbar junction: treatment by posterior bisegmental correction/fixation and staged anterior corpectomy and titanium cage implantation. Acta Neurochir (Wien) (2006) 148: 299 - 306.
10. Ozturk Cagatay, Aydinli Ufuk, Vural Recep, Sehirlioglu and Mutlu Muren. Simultaneous versus sequential one - stage combined anterior and posterior spinal surgery for spinal infections (outcomes and complications)
11. Gumbs Andrew A., Bloom Norman D., Bitan Fabian D. and Hanan Scott H. Open anterior approaches for lumbar spine procedures. The American Journal of Surgery 194 (2007) 98 - 102.

Author Information

N. S. Motsitsi, M.MED
Department of Orthopaedic Surgery, Kalafong Hospital