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Comparative evaluation of pedicular screw fixation and hartshill ring in dorsolumbar spinal injuries

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Abstract

Introduction: The dorso lumbar segment of spine (D10 to L2) is an unstable between fixed dorsal and mobile lumbar spine. The Hartshill rectangle fixation is a modification spinal instrumentation fixation. The rectangle formed allows it to fit snugly against the lamina and provides good rotational stability. While Pedicle screw instrumentation also place instrumentation within the spinal canal thus lessens the risk of neural injury.

Aim: Is to comparative evaluation of pedicular screw fixation and hartshill ring in dorsolumbar spinal injuries in terms of stability, functional outcome and postoperative complications.

Materials and method: Total no of patients was 50 (25 each).

Conclusion: Hartshill ring fixation is safe and simpler method, however pedicular screw fixation require more instruments, but it is more firm and and stable fixation.

Keywords: Pedicular screw fixation, hartshill ring, dorsolumbar spinal injuries

Introduction

In this developing era, with urbanization and industrialization, spinal trauma is increasing in incidence. Spinal injuries constitute one of the greatest calamities known to the medical world, causing great mortality and morbidity. 1 The vast majority of these injuries have shown to affect the motion segments between T11 and L2, that compromise the thoracolumbar junction. Patients with permanent residual neurologic deficit require life long social adjustment and supportive care. Spinal fixation is thought to be a difficult and major surgery. If we offer an easy, surgeon and patient friendly instrumentation, it will be a great help to paraplegic patients. The aim of the study is to compare between pedicular screw fixation and hartshill ring fixation in dorsolumbar spinal injuries in terms of stability, functional outcome and postoperative complications.

Materials and method

This prospective study was done in patna medical college and hospital, patna during October 2012 to September 2014. Total no of patients was 50 (25 each). Patients were admitted through outdoor and emergency, examined, operated and followed up for 1 year and studied. Those patients who came under Frankel's grade A, B, C were included and Frankel's D and E Were Excluded.

Posterior midline longitudinal incision according to need of exposure was taken in all cases. Hartshill ring with Drummond wires was used. Hole was made in thickest portion of base of spinous process. Then drummonds wire were introduced through the hole from either side and withdrawn from opposite side. Again passed through the button of opposite side. Two vertebra above and below were included for stabilization. Hartshill ring of desired size was placed over with one arm of wire lateral the other kept medial and were tied across the longitudinal arm of ring. Hartshill ring and sublaminar wire: two sublaminar wires were introduced below lamina taking precaution not to injure the dura mater. Two vertebra above and below were included for stabilization. Hartshill ring of desired size was placed over.

In case of pedicular screw fixation image intensifier was used to locate pedicle in anteroposterior and lateral view. Awl introduced up to anterior one third. Walls all around were checked by probe. Screw were fixed in both pedicle of and below the fractured vertebra followed by rod placement.

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Age group (years)	Hartshill fixation	Percentage (%)	Pedicular screw fixation	Percentage (%)
21-25	4	16	6	24
26-30	8	32	9	36
31-35	7	28	6	24
36-40	6	24	4	16
Total	25	100	25	100

Sex Incidence

Sex	Hartshill fixation	Percentage	Pedicular screw fixation	Percentage
Male	15	60	19	76
Female	10	40	6	24
Total	25	100	25	100

Level of vertebral injury

Vertebral injury level	Hartshill fixation	Percentage (%)	Pedicular screw fixation	Percentage (%)
T11	3	12	3	12
T12	8	32	9	36
L1	10	40	9	36
L2	4	16	4	16
Total	25	100	25	100

Time taken during surgery

Time (minutes)	Hartshill fixation	Percentage (%)	Pedicular fixation	Percentage (%)
<90	12	48	2	8
91-120	8	32	12	48
121-150	4	16	9	36
121-180	1	4	2	8
Total	25	100	25	100

Blood loss during surgery

Blood loss in ml	Hartshill fixation	Percentage (%)	Pedicular fixation	Percentage (%)
<300	16	64	7	28
301-400	7	28	13	52
401-500	2	8	5	20
>500	0	0	0	0
Total	25	100	25	100

Mobility status after 1 year

Mobility	Hartshill fixation	Percentage (%)	Pedicular fixation	Percentage (%)
bedridden	17	68	18	72
Walk with support	6	24	5	20
Walk without support	2	8	2	8
Total	25	100	25	100

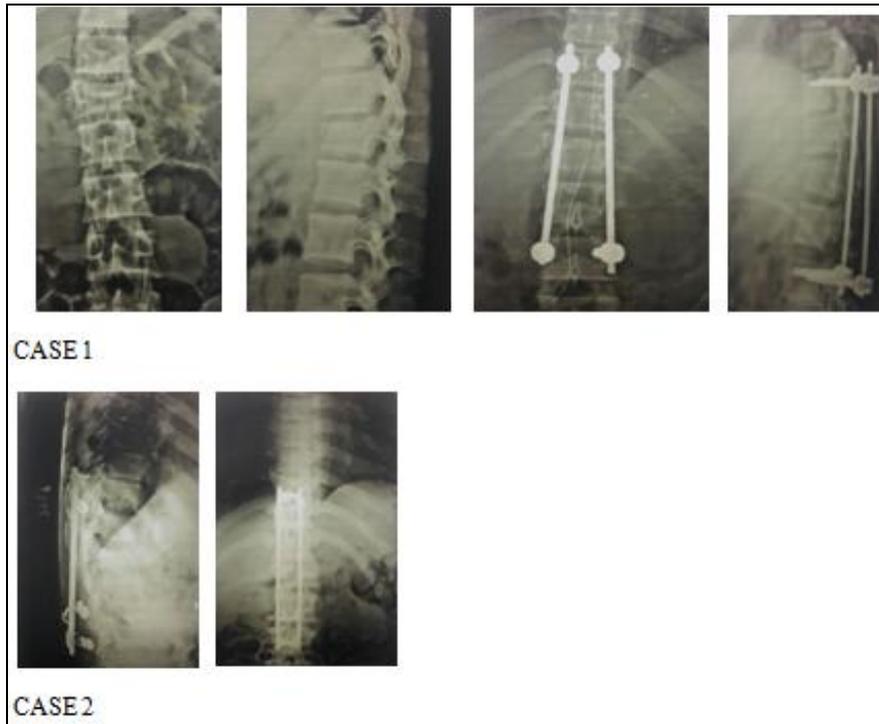
Neurological status of patient on admission and discharge in hartshill fixation

Frankel's grading	On admission	Percentage (%)	On discharge	Percentage (%)
A	14	56	4	16
B	8	32	13	52
C	3	12	6	24
D	0	0	2	8
E	0	0	0	0
Total	25	100	25	25

Neurological status of patient on admission and discharge in pedicle screw fixation

Frankel's grading	On admission	Percentage (%)	On discharge	Percentage (%)
A	18	72	5	20
B	5	20	13	52
C	2	8	5	20
D	0	0	2	8
E	0	0	0	0
Total	25	100	25	25

Post operative result



Discussion

Comparative study was done in cases, fixed either by hartshill ring or pedicular fixation (25 each). They were observed for one year. The present study is compared to the study done by Basheer and Gupta^[3] and Shah and Dodia study^[4].

The age group of patients involved in the present study was between 21-40 years. Mean age was 30.8 years. The chi-square static is 0.9357. The p-value is 0.816. The result is not significant. Maximum no of patients that is 17 out of 50 were in age group of 26- 30 years. The reason for this may be, this age group represents the working class of our society. Similar study was also found in study conducted by basher and gupta study.

There was male predominance in the present study consisting of 34 male out of 50. The chi square static is 1.4706 and the p-value is 0.2252. The result is comparable to study done by dodia *et al*.

More than 60 % of all injuries of thoracolumbar spine occurred between T 12-L1 vertebra and L1 being the commonest followed by T12. The result was comparable to the study of Kansal *et al*. 5 in which most common vertebra involved was L1 (12 out of 32).

Time taken during surgery. The average time taken during surgery in pedicular fixation was 122.2 min with standard deviation 21.56 min compared to hartshill fixation was 106.8 min with sd of 23.45 min. in pedicular fixation extra time was taken may be due to use of image intensifier. The chi square static is 10.19 and the p-value is 0.016 the result is significant. Time taken in other study was lesser than the present study.

Intra operative complication. Dural tear occurred in 2 cases out of 25 in hartshill group.

Mobility: Two patients in each group were able to walk independently after 1 year. 17 in Hartshill and 18 in pedicular group were wheelchair bound. The chi-square static is 0.410 and p-value is 0.810. The result is not significant.

Conclusion

It can be concluded that hartshill ring fixation is relatively safe and simpler method, however pedicular screw fixation demands expertise, require more instruments, but it is more firm and and stable fixation than hartshill fixation.

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