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OUTCOME OF FIXATION OF LATERAL MASS SECREWS AMONG PATIENTS SUFFERING FROM CERVICAL INJURY

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Abstract:

Objective: *The aim of this research work is to find out the outcome among patients suffering from cervical injury after the fixation of the lateral mass screws.*

Methodology: *88 patients suffering from cervical injury, as diagnosed by radiology, were the participants of this research work. All the patients having less than twelve year of age and greater than seventy year of age, patients present with traumatic discs and compression of cord or present with surgery of spine in past were not the part of this research work. All the patients had to undergo fixation of LMS (Lateral Mass Screws) through posterior technique under complete fluoroscopic control. We used the Frankel grading to evaluate the medical condition of all present patients before surgery and after surgical intervention.*

Results: *There were 68.180% (n: 60) male patients and 31.80% (n: 28) female patients. The range of the age of the patients was from 18 to 55 years with an average age of 32.0 ± 8.0 years. Major common injury level was C5-C6 in 52.0% (n: 46) patients. In accordance with the system of Frankel grading, 39.80% (n: 35) patients were in Grade-A, 17.050% (n: 15) patients were in Grade-B, 25.0% (n: 22) patients were in Grade-C, 13.60%) in Grade-D, 4.50% (n: 4) in Grade-E at the time of admission. After the surgical intervention, 18.20% (n: 16) patients were in Grade-A, 26.10% (n: 23) in Grade-B, 9.10% (n: 8) patients in Grade-C, 10.20% (n: 9) patients in Grade-D and 29.60% (n: 26) patients were in Grade-E with an improvement in neurological functionality in 58.0% (n: 51) as well as power in 42.0% (n: 37) patients. The most dangerous complications faced were the infections in respiratory function in 11.360% (n: 10) and infection of wound in 4.50% (n: 4) patients whereas 9.10% (n: 8) patients expired.*

Conclusion: *The technique of LMS is very effectual and secure procedure for cervical fixation after suitable reduction.*

KEYWORDS: *Infection, Neurological, Injury, Cervical, Wound, Complication, Lateral Mass Screws.*

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INTRODUCTION:

The injury of cervical spine is much frequent; the cause ascribed being an enhanced mobility of the cervical spine, forming it as susceptible to different degenerative diseases and trauma. The surgery of this portion is very difficult because of the close proximity. The compression of cervical cord is the cause of weakness in all 4 limbs with the magnetic resonance imaging being the examination of choice. Computerized tomography with 3D reconstruction supports in the planning of surgery. We can perform the surgery from both anterior and posterior sites. Fixation of LMS with rods or plates is the ideal method for the stability and fixation of the posterior cervical. Majority of the surgeons are present with the belief that techniques of fixation of LMS are the optimum procedures for the reconstruction of the stability after cervical injury. Regardless of the ease in the application of this method and better stability, when compared with the other methods, the most important risk remains that of violation of nerve root of spine, facet joint and vertebral artery. This research work carried out to know about the effectiveness of this procedure for the stabilization of the cervical spine.

METHODOLOGY:

This research work was carried out in Children Hospital Faisalabad from November 2016 to November 2019. The ethical committee of the hospital gave the permission to conduct this research work. There were 88 participants in this research work. All patients were suffering from cervical injury diagnosed by radiology. All the patients having age of lower than twelve years or greater than seventy years, present with traumatic discs, compression of spinal cord without sub-luxation and patients present with the past history of surgery of spine were not the part of this research work. The range of the time duration from injury to surgical intervention was from 5 to 15 days. We performed the standard procedure for fixation of LMS. All the patients had to undergo fixation of LMS (Lateral Mass Screws) through posterior technique under complete fluoroscopic control. We performed regular examination under guidance of radiology after regular intervals to check progress.

We collected the information on well-organized Performa. We used the Frankel grading system to evaluate the clinical condition of such patients before surgery and improvements after 6 months of surgery. We noted all the complications and mortalities. We used the SPSS V.23 for the statistical analysis of the collected information. We expressed the categorical variables in percentages and frequencies. We applied the Chi-square method for post stratification. P-value of less than 0.050 was the significant one.

RESULTS:

88 patients were the part of this research work. The range of the age of the patients was from 12 to 70 years with an average age of 32.0 ± 8.0 years. Very common injury level was C5-C6 in 52.0% (n: 46) patients as presented in Figure-1. In accordance with the system of Frankel grading, 39.80% (n: 35) patients were in Grade-A, 17.050% (n: 15) in Grade-B, 25.0% (n: 22) in Grade-C, 13.60% (n: 12) patients in Grade-D, 4.50% (n: 4) in Grade-E. After surgical intervention, 18.20% (n: 16) patients were in Grade-A, 26.10% (n: 23) in Grade-B, 9.10% (n: 8) in Grade-C, 10.20% (n: 9) in Grade-D and 29.60% (n: 26) patients were in Grade-E as presented in Table-1.

Table-I: Pre and Post- Operative Frankel Grades

Pre-Operative		Post-Operative						
Frankel Grade		A	B	C	D	E	Exp	Total
A	35.0	16.0	14.0	2.0	-	-	3.0	35.0
B	15.0	-	9.0	4.0	-	-	2.0	15.0
C	22.0	-	-	2.0	9.0	10.0	1.0	22.0
D	12.0	-	-	-	-	12.0	-	12.0
E	4.0	-	-	-	-	4.0	-	4.0
Total	88.0	16.0	23.0	8.0	9.0	26.0	6.0	88.0

There was an overall improvement in neurological functionality in 58.0% (n: 51) with P-value of 0.0010 and power in 42.0% (n: 37) patients, as presented in Table-2.

The prevalent complications were the infections of respiratory tract in 11.360% (n: 10) patients, infection of wound in 4.50% (n: 4) patients, root injury in 3.40% (n: 3) patients and injury of vertebral artery in 1.10% (n: 1) patient whereas the rate of mortality was 9.10% (n: 8). We managed the infection in all patients with high dose of antibiotics and routine dressing. There was no need of reoperation in any patient. There was no mortality related to procedure. Four patients died due to respiratory issues and four patients met their death due to pulmonary embolism.

Table-II: Group Wise Outcome Comparison

Post-Operative			
Frankel Grades	Pre-Operative (n=88)	p-Value <0.0010	
		Neurological Improvement Frankel Grade B and above	Improvement in power Frankel Grade D and E
Group-1 (A+B)	50.0	20.0	6.0
Group-2 (C+D)	34.0	31.0	31.0
Total	82.0	51.0	37.0

DISCUSSION:

Traumatic injury of spinal cord is very frequent with tragic results in the cervical spine region. The surgery of spine is of critical nature. Current research works displayed that early decompression gave outcomes in a highly favorable conclusion. Fixation of LMS has become the procedure of choice among other fixation techniques whenever there is compromise with the posterior elements. There is not wide utilization of the transarticular facet screws in sub-axial cervical spine which can be due to the unfamiliarity of the surgeons. There is description of many techniques of fixation of LMS after initial elaboration by Roy-Camille which was popularized by Louis and Magerl and more currently by Anderson and Ebraheim. This method of fixation of LMS has very low danger of injuring the spinal cord as proposed by Magerl and flowed in many research works as conducted by Wang. Neurologic damage can also be the outcome of the long screws insertion causing a disruption of ventral cortex. OAP (Oblique Antero-Posterior) diameter of articular pillar is for the representation of the screw length with a mean OAP diameter stated from 10.80 mm to 20.30 mm with an average 14.90 mm ± 1.80 as stated by the Sangari.

Some of the complications of this procedure are loosening of screws and pull out. Regardless of the probable complications, LMSs has very best profile of safety as discovered in this current research work that no patient was available with neurological damage. Very same to our rate of complication Katonis discovered no patients of vertebral artery, injury of spinal cord during placement of screw and exiting nerve. Graham and Roche claimed that the positioning of the screw is the main feature resulting into these complications. In this research work, we saw improvement in sensory and motor function as evaluated by the system of Frankel Grading after complete 6 months after placement of LMS with improvement in fifty-one (58.0%) patients with P value of 0.0010 and power in thirty-seven (42.0%) patients with P value of less than 0.0010 (Table-2) as concluded by Yehya.

Some research works have displayed that fixation of lateral mass screw rod followed by the fusion displays promise as an effectual and bio-mechanically sound method of therapy in the patients with proper cervical injury. This method is very effectual and secure but it is very difficult to utilize it in the patients present with anomalous cervical anatomy as it can lead to the injury of the nerves in spine or the arteries in vertebrae during the insertion of the screws therefore, we used the 3D computerized tomography for size measurement and shape before surgical intervention in all patients.

CONCLUSION:

The method of LMS is very effectual and secure procedure for the cervical fixation after suitable reduction that is able to make the cervical spine stable as well as it also gave the positive results with fully functional recovery.

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