

## EFFICACY OF INTRA OPERATIVE USE OF TRIAMCINOLONE IN LUMBAR DISCECTOMY

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### ABSTRACT

**Objective:** To evaluate the effect of epidural application of triamcinolone during lumbar discectomy on postoperative pain relief.

**Study Design:** Case control study.

**Place and Duration of Study:** Department of Neurosurgery, Combined Military Hospital Lahore, from Oct 2019 to Feb 2020.

**Methodology:** Thirty patients receiving intraoperative epidural triamcinolone application compared with 30 controls objective assessment by T-scores of the Timed Up and Go test, back and sciatic leg pain by Visual analog scale and for subjective functional impairment by Oswestry Disability Index were calculated pre-op, post-operative day 2 and at 4 weeks.

**Results:** The baseline demographics, disease specific features and preoperative impairment scores were similar among both groups. At day post-operative day 2, subjective impairment on Oswestry disability index for the steroid group was (30.6 vs 36.2,  $p < 0.01$ ), with significant difference in terms of objective functional impairment score between steroid group (T-score 128.2 vs 129.3,  $p < 0.01$ ). At 4 weeks post operatively, the Objective functional impairment was also found to be significantly less in the steroid group (T-score 100.5 vs 110.3,  $p < 0.01$ ), with less disabled steroid group patients with Oswestry disability index (17.0 vs 24,  $p < 0.01$ ). Complication rates in both groups were similar. The duration of hospital stay was shorter among the steroid group (5.0 vs 5.8 days,  $p = 0.06$ ).

**Conclusion:** The application of triamcinolone in lumbar discectomy leads to benefit in both subjective and objective pain parameters in the early postoperative period.

**Keywords:** Disc, Steroid, Triamcinolone.

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### INTRODUCTION

Herniated lumbar disc leads to back pain and sciatica via compression and irritation of the nerve roots<sup>1,2</sup>. Although discectomy removes the pressure on the compressed nerve root, the inflammatory response persists for many weeks post-surgery<sup>3</sup>. The resultant pain leads to difficulty in early mobilization and physio-therapy with consequential longer hospital stay and delay in recovery<sup>4</sup>. Intraoperative use of epidural steroids was first described by Jones and Barnett in 1955 and they reported a significant benefit with their use<sup>5</sup>. Numerous recent studies have investigated the effects of intraoperative use of epidural steroids<sup>6-8</sup>. These studies based on subjective disability measures reported a good pain control in the

short term, but this benefit could not be demonstrated in the longer term. The recent introduction of standardized objective tools warrants a repeat analysis of this treatment modality in the management of this patient population<sup>9,10</sup>. The goal of this study was to evaluate the benefit derived from direct intraoperative application of triamcinolone using objective and subjective functional scales in our local patient population.

### METHODOLOGY

Case control study was conducted at Neurosurgery department of Combined Military Hospital (CMH) Lahore. It was approved by the hospital ethics review committee vide reference No. 142/2019. 'Sampsize' online calculator was used for sample size calculation with confidence interval of 95%, margin of error 5% and reference prevalence of 3.6% for degenerative lumbar spine disease<sup>11</sup>. Sixty patients of both gender with age

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range from 14-60 years who were planned for discectomy for lumbar disc herniation without fusion were selected after taking informed consent from patient, using non-probability consecutive sampling technique. Patient were divided into two groups, 30 patients receiving intra-operative epidural triamcinolone application (SA group) were compared with 30 patients who underwent lumbar discectomy without steroid during surgery (control group). The database collected included general information (age, gender, smoking, and working status), opioid use, co-morbidities, anesthesiology risk (American Society of Anesthesiologists [ASA] physical status classification) and motor impairment. OFI (objective functional impairment) was identified by employing the Timed Up and Go (TUG) test both before and after surgery. This test is used to establish a standardized and objective assessment in lumbar degenerative disc disease. It assesses simple but important functions essential for patients to resume their activities of daily living and retain quality of life in the context of their disease. It measures the time taken by a person to rise up from a chair, walk three meters, turn around, walk back and sit on the chair. Before surgery, patients were asked to score their back and leg pain from 0 to 10 on the visual analog scale. The subjective measure of functional disability was calculated by using the Oswestry disability index (ODI). This data was collected before the operation, second day after surgery and then at the fourth week post-operatively. Information on post-operative complications like cerebrospinal fluid leak, repeat surgery and wound infection were noted till fourth post-operative week. Length of hospitalization was also recorded. All the data was entered on pre-designed proforma. Surgery was performed under general anesthesia in the lateral position in all patients. Infection prophylaxis was achieved with a single preoperative dose of 2 gram intravenous ceftriaxone. The incision was marked using anatomic landmarks. Skin was incised at the midline. Opening was made in the fascia using cautery and subperiosteal dissection used to expose the laminae.

The microscope was used at this stage and laminotomy was performed of the superior lamina using high speed drill. Thinning of ligamentum flavum was carried out and the bone work was completed. A foraminotomy was performed using Kerrison rongeur where required. The nerve root was retracted followed by sequestrectomy or partial discectomy as needed. After irrigation with saline and securing hemostasis, the epidural space of the decompressed root was irrigated with 40 mg injection of triamcinolone. No wound infiltration of local anesthetic agent was done so that the effect of per operative steroids on early post-operative pain could be assessed. No drains were used and wound was then closed in layers.

Data was analysed using SPSS software version 20. Frequencies, percentages and means were calculated for quantitative variables. Chi-square test was applied to analyse correlation amongst categorical variables. The  $p$ -value of  $\leq 0.05$  was considered statistically significant.

## RESULTS

Sixty patients of both groups had mean age of  $48.2 \pm 11.6$  years and 38 (63.3%) patients were male. The baseline demographics and disease specific features were essentially similar among both groups as evidenced by table-I. Two levels or more had disc degeneration in 1 (3.3%) of steroid group and 2 (6.7%) of control group of patients whereas L5/S1 was the most common level i.e. 15 (50%) of steroid group and 14 (46.7%) of control group. Modic degenerative changes was present in 15 (50%) steroid group and 17 (56.7%) control group. Table-II shows the similarity of preoperative pain levels along with objective (Timed up and go) and subjective impairment criteria (Visual analogue score back and leg, Oswestry disability index) of the two groups. At day 2, the difference in terms of objective functional impairment between steroid application group (T-score 128.2) and the control group (T-score 129.3) was significant ( $p < 0.01$ ). Impairment on oswestry disability index for the steroid application group was 30.6 vs 36.2 for the control group which was also significant ( $p < 0.01$ ). At

week 4, the objective functional impairment was found to be significantly less in the steroid application group (T-score 100.5 vs 110.3,  $p < 0.01$ ). The patients in the steroid application group were also less disabled on the Oswestry disability index

**Table-I: Baseline demographics.**

Variable	Steroid Application Group, n (%)	Control Group n (%)
Age	45.3 ± 13.6	47.9 ± 10.4
<b>Gender</b>		
Male	20 (66.7%)	18 (60%)
Female	10 (33.3%)	12 (40%)
<b>Smoking</b>		
Yes	12 (40%)	10 (33.3%)
No	18 (60%)	20 (66.7%)
<b>Work Status</b>		
Full/part-time	18 (60%)	23 (76.7%)
Not working	7 (23.3%)	5 (16.7%)
Disabled	2 (6.7%)	1 (3.3%)
Retired	3 (10%)	1 (3.3%)
<b>Opioid use</b>		
No	23 (76.7%)	24 (80%)
Yes	7 (23.3%)	6 (20%)
<b>ASA</b>		
0-1	8 (26.7%)	11 (36.7%)
2-3	22 (73.3%)	19 (63.3%)

**Table-II: Preoperative pain and disability.**

Measure	Steroid Application Group (n + SD)	Control Group (n + SD)	p-value
Visual Analogue Score (back)	3.63 + 1.49	3.73 + 1.43	0.792
Visual Analogue Score (leg)	5.63 + 1.77	5.23 + 1.47	0.346
Oswestry Disability Index	50.07 + 8.81	54.07 + 10.06	0.107
Timed Up and Go test (T-score)	139.6 + 9.63	143.8 + 12.15	0.143

**Table-III: Complications within 4 weeks of surgery.**

Complication	Steroid Application Group, n(%)	Control Group, n(%)
None	27 (90%)	26 (86.7%)
Repeat Surgery	1 (3.33%)	2 (6.7%)
Infection	2 (6.7%)	1 (3.3%)
CSF leak	-	1 (3.3%)

(17.0 vs 24,  $p < 0.01$ ). The complication rate in both groups is shown in table-III. The infection rate was higher in the steroid application group

( $p = 0.513$ ). The patients receiving steroid also stayed for a shorter duration in the hospital (5.0 vs 5.8 days,  $p = 0.066$ ).

## DISCUSSION

The rationale for application of intraoperative steroids during lumbar discectomy is based on the histopathological evidence of chemical irritation and inflammatory changes in nerve roots of patients with prolapsed intervertebral discs<sup>12,13</sup>. Re.view of randomized control trials by Waqas favored intra operative use of steroids for lumbar disc surgery as it did improve pain in the post-operative period with fewer complications<sup>14</sup>. In spite of reported benefits including earlier mobilization, reduced requirement of post-operative pain killers and earlier discharge from the hospital, the technique is not employed routinely amongst the neurosurgeons<sup>15</sup>. One possible reason is that the efficacy is still controversial and is supported by subjective measures of outcome improvement only<sup>16</sup>. In our study subjective assessment of epidural steroid application based on the Oswestry disability index showed marked improvement on the second day ( $p < 0.01$ ) and fourth week after surgery ( $p < 0.01$ ). We supplemented our findings with objective assessment using timed up and go test provides an easy, reliable and reproducible measure of the dysfunction experienced by patients with lumbar disc pathology<sup>17,18</sup>. We found out that mean T-score on day 2 was statistically less in steroid group of patients ( $p = 0.00$ ), despite the fact that patients could have wound related pain in early postoperative period. Likewise after four weeks postoperatively, mean T score was also significantly less ( $p < 0.01$ ) highlighting the objective improvement in terms of pain and disability provided by intraoperative use of epidural steroids.

The fact that steroids blunt the inflammatory response has been used to question the safety of their application and raise concerns about increase in postoperative infection rates<sup>19,20</sup>. Asomugha observed clinically significant more surgical site infection in patients with use of epidural steroid paste but that was found in patients who

already had peri operative risks of infection<sup>21</sup>. Lowell *et al* even found three cases with epidural abscesses with peri operative steroid use<sup>22</sup>. Present study did not find any increase in overall complication rate in terms of repeat surgery, cerebrospinal fluid leak and wound infection. Our patients with per operative triamcinolone application also had a shorter length of hospital stay as compared to control group ( $p=0.06$ ) as substantiated by Ranguis in their study<sup>23</sup>.

The limitation of the current study is that it is a non-randomized which can imply selection bias. In order to establish dose-response relationship, different doses of steroids can be injected as done by Probereskin who used 20 and 40 mg of steroid<sup>24</sup>. Similarly, Mastronardi used a different compound like morphine<sup>25</sup>. Late complications and potential benefit of steroid on epidural scarring would require a longer duration of follow up in further studies.

## CONCLUSION

The use of per operative triamcinolone in lumbar discectomy leads to improvement in pain in early postoperative period in both subjective and objective parameters of pain assessment. Relatively more infection in steroid group of patients is outweighed by the benefits in terms of less disability, reduced requirement of postoperative analgesics and shorter hospital stay.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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