ORIGINAL RESEARCH

A comparative assessment on the 90 mg of duloxetine's efficacy in relieving postoperatal pain in patients undergoing spine surgery

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ABSTRACT

Aims and objectives: To assess the effectiveness of duloxetine at various dosages for the management of postoperative pain in patients having lumbar spine surgery. **Material and method**: After being scheduled for lumbar spine surgery under general anaesthesia, 60 patients of both sexes with ASA grades I and II were randomly assigned to 2 groups, each with 30 members. Patients in Group D (n=30) were given two tablets of duloxetine, 90 mg one hour before to surgery and another the next morning. Patients in group "P" (n = 30) were given a placebo pill an hour before to surgery and again the morning after. After surgery, the following measurements were made: heart rate, blood pressure, breathing rate, and the intensity of pain on the NRS scale at 0, 4, 8, 12, 16, 20, 24, 28, 32, and 48 hours. Additionally, the occurrence or non-occurrence of side symptoms such headache, nausea, vomiting, dizziness, and sleepiness was recorded. **Result**: Analysis showed that when oral Duloxetine 90 mg was used instead of a placebo, the duration for the initial analgesic necessity was much longer. Pre-emptive oral Duloxetine 90 mg reduces postoperative pain intensity in patients undergoing lumbar spine surgery under general anaesthesia, although not much less so than a placebo. There was no discernible impact of 90 mg of oral duloxetine on respiratory or cardiovascular measures. Patients on duloxetine experienced nausea and vomiting more often. **Conclusion:** When taking 90 mg of oral Duloxetine instead of a placebo, the period before the need for a first analgesic was much longer.

Keywords: Duloxetine, lumbar spine surgery, post operative analgesia

INTRODUCTION

Lumbar and spine procedures are almost always elective. Laminectomies, discetomies, spinal fusions, scoliosis corrections, and removal of spinal tumours are among the common spine procedures.

Spinal procedures often result in significant dissection of the bones, ligaments, and subcutaneous tissues, which causes a significant amount of post-operative discomfort (1). One of the main factors contributing to postoperative morbidity is pain. A multitude of unpleasant sensory and emotional experiences that are often linked to autonomic hyperactivity, decreased mobility, endocrine metabolic changes, psychological and behavioural reactions, might result from inadequate treatment of postoperative pain.

It's critical to handle pain well to avoid unfavourable consequences (2). Advances in the understanding of molecular mechanisms have resulted in the creation of novel pharmacological medicines and multimodal analgesia for the management of postoperative pain (2). Antidepressants like duloxetine, a selective serotonin and norepinephrine reuptake inhibitor (SSNRI), have been effective in treating chronic and persistent pain in recent times.

Additionally, it may enhance the quality of recovery after surgery by elevating mood, which is beneficial throughout the recovery phase.

Duloxetine (SSNRI) was introduced in the field of pain management as an adjuvant, pertaining to its antinociceptive effect and ability to modulate pain pathways as it could interfere with chronic post surgical pain occurrence[1]. SSNRI antidepressants have been shown to provide varying degrees of pain relief in various chronic pain syndromes including post herpetic neuralgia, diabetic neuropathy, and fibromyalgia.As the role of duloxetine in acute pain

has not been explored so far, therefore duloxetine may play an uncharacterized role in reducing acute postoperative pain as well as reducing dose of analgesic consumption[3]. In spinal decompression surgery, surgical tissue injury to soft tissues and bony structures results in nociceptive pain, in addition to neuropathic pain resulting from manipulation of neurological tissue[4].Surgical incision leads to central sensitization which results in significant postoperative pain. To prevent establishment of altered central processing, analgesic treatment can be given which results in reduction of acute postoperative pain and chronic pain development[5]. Studies have been use of single dose of duloxetine for postoperative pain relief; but none has been done so far for use of duloxetine in different doses. Therefore the present study has been designed to evaluatethe efficacy of duloxetine in different doses for postoperative pain relief in patients undergoing lumbar spine surgery.

MATERIAL AND METHODS

Sixty ASA grade I & II patients of both sexes are slated for general anaesthesia lumbar spine surgery. After being selected and informed about the operation, 80 patients who met the eligibility requirements had their signed permission obtained. Two groups of patients (40 in each group) were randomly assigned.

Patients in Group D (n=40) were given two tablets of duloxetine, 90 mg one hour before to surgery and another the next morning.

Patients in group "P" (n = 40) were given a placebo pill an hour before to surgery and again the morning after.

Heart rate, blood pressure, breathing rate, and pain intensity on the NRS scale (0–10) were recorded at 0, 4, 8, 12, 16, 20, 24, 28, 32, and 48 hours after surgery. Additionally, the occurrence or non-occurrence of side symptoms such headache, nausea, vomiting, dizziness, and sleepiness was recorded.

RESULT AND ANALYSIS

Table: Showing demographic profile of patients in two groups

S.no.	Parameters	Group D		Group P		p value
		Mean	±SD	Mean	±SD	
1.	Age (yrs)	43.32	11.96	48.4	12.42	0.128#
2.	Weight (kgs)	66.24	8.23	66.77	6.83	0.426#
3.	Sex (M:F)	19:11		23:9		

Table 1 showing demographic profile of patients in three groups according to age, weightand sex.
Statistical analysis of Mean ±SD of Age and Weight of the groups were comparable in both groups and statistically insignificant (p>0.05).

Table 2: Duration (min) of surgery (Mean ±SD

Duration of surgery	Group D	Group P
Minutes (Mean±SD)	136.51±42.08	120.0±29.34

There was no statistically significant difference in duration of surgery in these two groups(p>0.05)

Table 3: Time for Rescue Analgesia (TRA)

Parameter	Group D	Group P
TRA (mins)	117.51±15.91	41.63±8.95

Above table showing statistical analysis of Time for Rescue Analgesia in these two groups (p>0.05)

Table 4: comparison of pulse rate at various time intervals

SN	Time Hrs	Group D Mean(±SD)	Group P Mean(±SD)	P value
1	Pre-op	86.94±6.739	86.04±7.855	
2	PO-0	91.94±12.546	98.66±7.201	p> 0.05
3	PO-4	88.12±9.487	87.49±5.874	p> 0.05
4	PO-8	87.89±8.846	88.56±6.316	p> 0.05
5	PO-12	88.76±8.411	87.34±6.904	p> 0.05
6	PO-16	88.24±8.929	87.41±4.351	p> 0.05
7	PO-20	86.79±8.469	87.74±3.11	p> 0.05
8	PO-24	86.74±8.871	88.21±6.430	p> 0.05
9	PO-28	85.14±8.650	84.96±4.087	p> 0.05
10	PO-32	84.49±9.170	85.87±3.987	p> 0.05
11	PO-048	87.32±11.512	87.41±5.732	p> 0.05

Above table showing statistical analysis of pulse rate at different post operative time intervals in comparison to preoperative pulse rate. No statical significant difference was seen.

Table 5: comparison of Mean Blood Pressure (MBP) at various time intervals

SN	Time Hrs	Group D Mean(±SD)	Group P Mean(±SD)	P value
1	Pre-op	94.67±6.721	95.61±9.190	p> 0.05
2	PO-0	99.66±6.45	107.08±5.97	p> 0.05
3	PO-4	97.02±5.01	97.71±4.10	p> 0.05
4	PO-8	95.77±7.08	96.04±4.98	p> 0.05
5	PO-12	95.43±4.61	95.77±4.78	p> 0.05
6	PO-16	95.19±4.48	95.76±3.71	p> 0.05
7	PO-20	94.81±4.05	95.54±3.68	p> 0.05
8	PO-24	94.55±6.02	95.11±5.01	p> 0.05
9	PO-28	93.97±4.91	94.77±3.98	p> 0.05
10	PO-32	92.70±4.55	94.03±3.81	p> 0.05
11	PO-048	95.58±5.71	96.03±4.94	p> 0.05

Above table show in statistical analysis of mean blood pressure at different post operative time intervals.. No significant difference was seen.

Table 6: Mean Numeric Rating Scale (NRS) score at different time interval

SN	Time Hrs	Group D Mean(±SD)	Group P Mean(±SD)	P value
1	PO-0	3.1±0.649	4.21±0.890	p> 0.05
2	PO-4	3.5±0.497	3.41±0.932	p> 0.05
3	PO-8	4.51±0.598	4.81±0.884	p> 0.05
4	PO-12	3.51±0.878	3.79±2.019	p> 0.05
5	PO-16	3.81±0.565	3.91±0.945	p> 0.05
6	PO-20	3.57±0.548	3.57±2.058	p> 0.05
7	PO-24	2.79±0.688	3.00±0.717	p> 0.05
8	PO-28	3.11±0.305	3.11±0.842	p> 0.05
9	PO-32	3.00±0.227	3.10±0.854	p> 0.05
10	PO-048	3.9±0.633	3.21±0.759	p> 0.05

Above table showing statistical analysis of post operative NRS Score at different time interval in the three groups. No significant difference is seen at different point of time postoperatively in both group.

DISCUSSION

Our research examined the impact of short-term, varying-dose duloxetine administration on immediate postoperative pain in individuals having lumbar spine surgery while sedated. Age, weight, and sex distributions are same in both groups in our research.We discover that it was statistically insignificant (Table 1).

DURATION OF SURGERY The mean ± standard deviation of the surgery length (min) for groups D and P was 135.50±41.07 and 119.0±28.35 minutes, respectively, as shown in table 2. These numbers did not have statistical significance. The mean ± standard deviation of the surgery length (min) for groups D and P were 116.50±14.90 and 40.62±7.94 minutes, respectively, as shown in table 3. There was statistical significance in these results. Attia JZ et al. (3), Kassim DY et al. (4), Nasr DA et al. (5), Govil N et al. (6), Lierz P et al. (7), and Srivastava S et al. (8) are in agreement with our research. A statistically significant difference was seen at 1 sthrpostoperatively between the statistics of the postoperative pulse rate at various time intervals and the preoperative pulse rate. This difference may be the result of emerging from general anaesthesia. At the 4th, 8th, 12th, 16th, 20th, 24th, 28th, 32nd, and 48th postoperative hours, there was no discernible change. According to Kassim DY et al., our research (4) Regarding postoperative side effects, the research found that the incidence of postoperative nausea and vomiting as well as sleepiness was greater in the duloxetine 90 mg group compared to the placebo group, and all cases in both groups were haemodynamically stable. (9), (10)

Duloxetine is a selective SNRI that is efficacious in chronic pain conditions such as painful diabetic neuropathy and fibromyalgia.The possible mechanism of action of duloxetine in our study could be explained by the central pain inhibitory action secondary to the potentiation of serotonergic and noradrenergic activities in the CNS. For ethical consideration, we did not allow patients to suffer pain with NRS≥4 and the mean NRS-pain scores in all the groups were approximately 3 throughout the entire study period. Any patients that suffered pain (NRS≥4) was offered rescue analgesia in form of tramadol 2mg/kg IV. However all patients were given intravenous paracetamol 1gm by infusion (100 ml over 30 minutes)every 8 hours, starting from 6th postoperative hours, for 48 hours after surgery for pain management. Thus we expected that all three groups shall show similar NRS scores with no

statistically significant difference between the groups in this aspect. On statistical comparison of average NRS scores of 48 hours observation period, no significant difference ($p>0.05$) was seen in NRS scores at different point of time postoperatively among the study groups and all the three groups were comparable.

Few studies have evaluated the effect of duloxetine on pain scores in postoperative period. Bedin A et al (11) evaluated the efficacy of 60mg duloxetine in patients undergoing elective spine surgery, and Ho KY et al (13) performed the same evaluation in patients undergoing knee replacement surgery in whichthey found no significant difference between the groups in pain scores.

There are few limitations to our study. Firstly, the study lacks any information about the opioids sparing effect of duloxetine. The reason being our institutional pain management strategy. We prefer to use paracetamol infusion for postoperative pain management and tramadol for rescue analgesia instead of opioids.

CONCLUSION

Analysis showed that when oral Duloxetine 90 mg was used instead of a placebo, the duration for the initial analgesic necessity was much longer. Preventive oral Duloxetine 90 mg reduces postoperative pain but not much as compared to placebo in individuals scheduled for general anaesthesia lumbar spine surgery. There was no discernible impact of 90 mg of oral duloxetine on respiratory or cardiovascular measures. Patients on duloxetine experienced nausea and vomiting more often.

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