

# Use Of Tenoxicam For Post Craniotomy Pain Relief With Or Without Bupivacaine Scalp Infiltration: A Randomized Study

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## Abstract

**Background.** Craniotomies are generally thought to be less painful than other operations, but this assumption has been challenged. Researchers have used different regimens of postcraniotomy pain relief including intravenous tramadol, codien, piritramide, paracetamol, nalbuphine PCA with oxycodone, morphine, intramuscular ketoprofen, prepinning scalp infiltration of bupivacaine 0.25% or ropivacaine. As there is very little evidence for the efficacy of tenoxicam 20 mg for postcraniotomy pain control in conjunction with scalp infiltration of bupivacaine 0.25%. We were aimed to build up this evidence.

**Patients and Methods.** Sixty patients undergoing craniectomy for brain tumor excision were enrolled. Patients were classified into two groups (each 30) depending on the treatment received. Group I received local infiltration of bupivacaine 10 cc (0.25) at each site before skull pinning and they received tenoxicam 20mg i.m in the recovery period for postoperative analgesia 12 hourly. Group II patients received placebo (normal saline) 15cc at each site before skull pinning and tenoxicam 20mg i.m 12 hourly for postoperative analgesia. VAS was used to measure the severity of postoperative pain (0-100 mm scale was used). Data were analyzed. Groups were compared to each other using the parametric or nonparametric t test, nominal data were compared using Fisher's exact test. P values < 0.05 were considered significant.

**Results.** On the 2nd and 4th hr of assessment period postoperatively significant difference was recorded with less VAS in group I vs group II ( $P < 0.05$ ). On the subsequent measurements and up to 48hr postoperatively non-significant differences were recorded ( $P > 0.05$ ).

**Conclusion.** Combined with intramuscular tenoxicam, bupivacaine skin infiltration was effective in reducing post-craniectomy pain.

## INTRODUCTION

Postoperative pain is an important clinical problem that has received much attention in recent years. Anaesthetists today pride themselves on keeping their patients pain free. Nonetheless, it was not until 1996 when De Benedettis et al undertook a pilot study to assess postoperative pain in neurosurgery that the incidence, magnitude, and duration of acute pain experienced by neurosurgical patients was quantified (1). Craniotomies are generally thought to be less painful than other operations, but this assumption has been challenged (2,3). In their pilot study published in 1996, De

Benedettis et al showed that postoperative pain was more common than generally assumed, quoting a figure of 60%. In two-thirds of these patients, the intensity of pain was moderate to severe. Pain most frequently occurred within the first 48 h after surgery, but up to 32% of patients still endured pain after this initial period (1). While craniotomy pain may be less severe than pain after other operations, there is a growing consensus that it remains under-treated in the acute recovery phase for at least a minority of patients (4). Researchers have used different regimens of postcraniotomy pain relief including intravenous tramadol, codeine, piritramide, paracetamol, nalbuphine PCA with

oxycodone, morphine, intramuscular ketoprofen, prepinning scalp infiltration of bupivacain 0.25% or ropivacain (5). Majority considered opiates as a two way sword because of the fear of sedation and respiratory depression but at the same time there is a concern of inadequate analgesia as well.

We conducted a double blind, prospective, randomized, placebo controlled study to test

the hypothesis that fixation of head by the skull pins not only causes immediate

hemodynamic response but also contributes in the postoperative pain.

## **PATIENTS AND METHODS**

After approval of the Human Research Ethics Committee of the hospital, 60 patients were

recruited undergoing flap craniotomy for resection of supratentorial tumor. An informed

written as well as verbal consent was obtained from all of them. They were divided into

group I and II. Group I patients received bupivacain 0.25 % without adrenaline, 5-10 mls

at the site of skull pins insertion, while the control group II received same amount of

normal saline.

Inclusion included, age between 18 to 70 yrs ; ASA I and II of either sex, GCS

15/15 pre-operatively with no sign and symptom of raised intracranial pressure,

undergoing elective neurosurgery under general anesthesia; and patients who required

skull pin fixation for positioning, admitted to the hospital for at least 1 postoperative

night. Exclusion criteria included, life-threatening condition emergency nature of surgery,

age less than 18 yr or more than 70 yr, pre or post operative GCS less than 15/15,

known or incidental finding of hypersensitivity to local anaesthetics or NSAIDs.

The first author visited all the patients for pre operative assesment in the ward 1 day

before the surgery. Having found suitable for the study, he educated them about VAS

(Visual Analogue Scale) to be used postoperatively. VAS has a range of 0 - 100 mm,

with zero denoting no pain while 100 denoting the most excruciating pain. All patients

were premedicated with oral lorazepam 2mg, 2hr preoperatively. Randomization was

performed by a computer generated form. Bupivacain 0.25% without adrenaline or saline

was prepared in a 10 mls identical syringe, by the second author. It was then given to the

surgeon to infiltrate in a sterilized manner. Everyone was blind about the study drug

except the second author. The code was broken only after all the data were collected and

analyzed by the first author. Before induction of general anesthesia, the radial artery was

cannulated under local anesthesia and connected to a transducer (Datex Ohmeda AS/3

Anesthesia Monitor, Datex Engstorm Heliniski, Finland) placed at the midaxillary level.

Standard monitors (electrocardiogram and SpO2 probe) were also placed before

induction. Heart rate, systolic arterial pressure, diastolic arterial pressure, mean arterial

pressure, and SpO<sub>2</sub> were recorded automatically by the monitor at 3-minute intervals

starting at least 3 minutes prior to induction of anesthesia until the end of surgery and

patient was extubated. A standard induction protocol was followed which included 1

mic/kg fentanyl, 2 mg/kg propofol, and 0.5-0.8 mg/kg rocuronium. Anesthesia was

maintained by 1 to 2 MAC of sevoflurane in 35% oxygen with air. Fentanyl ( 1

mic/kg/min ) and rocuronium infusion was continued till the closure of cranial bone flap.

Ventilation was controlled mechanically to maintain an end-tidal CO<sub>2</sub> level <30 mm Hg.

Hypertension (>20% increase in mean arterial pressure above the preinduction level)

during any stage of surgery was treated by increasing the inhaled sevoflurane

concentration. Heart rate systolic, diastolic & mean arterial blood pressure, ETCO<sub>2</sub> were

recorded throughout the procedure. Half an hour before the completion of surgery

tenoxicam 20 mg IM was given which was kept continued 12 hourly for next 48 hours.

After extubation patients were shifted to high dependency area for close monitoring.

They were enquired about pain intensity according to VAS at 2,4,6,8,10,12, 18, 24, 36 &

48 hr. Any untoward effect like nausea, vomiting, drowsiness, bleeding or shivering etc

were also noted during above mentioned period. Data were analyzed using a statistical

software package (Graph Pad In Stat® version 3.00 for Windows, Graph Pad Software

Inc., San Diego, California, USA) and presented as mean (SD), number (percentage), or

ratio as appropriate. Groups were compared to each other using the parametric or

nonparametric t test, nominal data were compared using Fisher's exact test. P values <

0.05 were considered significant.

## RESULTS

The demographic characteristics of the patients were similar (Table 1).there were no

significant difference between hemodynamic parameters between both groups (P>0.05).

Nausea occurred in 25% of both groups, shivering occurred in 25% in group I and in

36.36% in group II (P<0.05). Between 6 and 24hr there was non-significant differences in

VAS between the two groups (P>0.05). At 36 and 48hr VAS was recorded significantly

lower in group I vs II (P<0.05) (Table 2 and Figure 1).

### Figure 1

Table 1: Demographic data of both groups (GI and II).

	GI	GII	Sign.
Age (yr)	47.30±13.157	44.77±15.520	0.442
Weight (kg)	70.61±13.878	72.29±13.767	0.606
Hemoglobin	13.040±1.857	13.380±1.6715	0.299
Surgery time (hr)	5.52±0.725	5.72±0.520	0.264
Hematocrite	32.077±3.6412	30.956±4.8675	0.551
Blood loss (ml)	590±145.862	611.67±78.43	0.486

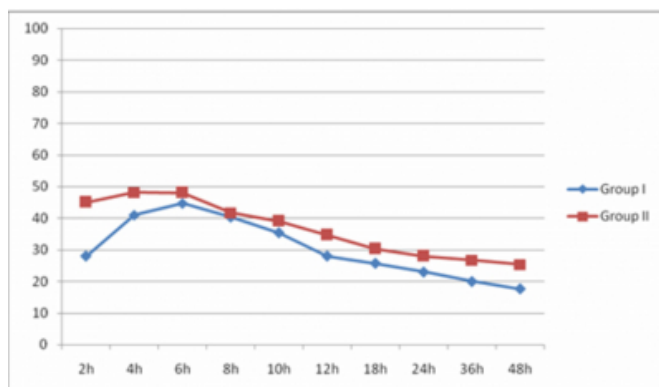
**Figure 2**

Table 2: VAS of both groups.

	Group I	Group II	P
2h	28	45	.000
4h	41	48	.002
6h	44	48	.397
8h	40	41	.666
10h	35	39	.228
12h	30	34	.352
18h	25	30	.119
24h	23	28	.109
36h	20	26	.016
48h	17	25	.001

**Figure 3**

Figure 1: VAS of both groups.



## DISCUSSION

Skull pin insertion is not only common but an essential maneuver to stabilize the head during neurosurgery. The skull pins traverse the skin, galea, and periosteum and lodge into the external lamina. This maneuver not only cause sudden hemodynamic changes but also need more analgesia postoperatively (6). In post craniotomy patients cerebral auto regulation is impaired. Pain is described as prominently superficial in the majority of patients, suggesting a somatic rather than a visceral origin. The pain is thought to arise from pericranial muscle and soft tissue. Suboccipital and subtemporal routes are associated with the highest incidence of pain, possibly related to surgical stress in major muscle tissues, i.e. the temporal, splenium capitis and cervicis muscles. The pain that results is typically nociceptive in

nature and is secondary to the surgical incision and reflection of the muscle underlying the scalp (7). Pain is not thought to arise from the brain tissue itself. Recent evidence suggests that surgical incision and other noxious peri-operative events may induce prolonged changes in central neural function that will later contribute to postoperative pain. It was reported in one study that bupivacaine skin infiltration at incision site diminished the hemodynamic effects and improved the quality of analgesia postoperatively (8). The present study was designed to evaluate the effect skull pin insertion on pain score postoperatively. In our institution it is a routine practice to infiltrate the skin before an incision is made. We followed the same protocol in both groups. Not only this, but we continued tenoxicam 20 mg IM 12 hourly till 48 hours. In this way we kept all the treatment similar with the only difference of bupivacaine skin infiltration at skull pin insertion site in both groups. We have found that patients who received pre-incision bupivacaine skin infiltration combined with postoperative analgesia using tenoxicam experienced long term analgesia postoperatively.

In conclusion, combined pre-incision bupivacaine skin infiltration combined with

systemic tenoxicam resulted in excellent postoperative analgesia following craniotomy.

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## References

1. De Benedittis G, Lorenzetti A, Migliore M, et al. Postoperative pain in neurosurgery: a pilot study in brain surgery. *Neurosurgery* 1996;38:466-70.
2. Goldsack C, Soublak S, Smith M. A double blind comparison of codeine and morphine for post operative analgesia following intracranial surgery. *1996;51:1029-1032*.
3. Graham A, Reid M, Andrew P. Perception of pain experienced and adequacy of analgesia following elective craniotomy. *Anaesthesia* 1999;54:814-815.
4. Cousins M, Umedaly H. Post-operative pain management in the neurosurgical patient. *Int Anesthesiol Clin* 1996;34:179-193.

5. Gottschalk A, Yaster M. Pain management after craniotomy. *Neurosurgery*

2007;17:64-73.

6. Hillman DR, Rung GW, Thompson WR, et al. Effect of bupivacaine scalp infiltration

on the hemodynamic response to craniotomy under general anesthesia. *Anesthesiology*

1987;67:1001-3.

7. Roberts GC. Post-craniotomy analgesia: current practices

in British neurosurgical

centres-a survey of post-craniotomy analgesic practices. *Eur J Anaesthesiol* 2005;22:

328-332.

8. Biswas BK, Bithal PK. Preincision 0.25% bupivacaine scalp infiltration and

posteranotomy pain. *J Neurosurg Anesthesiol* 2003;15:234-239.

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