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COMPARATIVE EVALUATION OF EPIDURAL AND GENERAL ANAESTHETIC TECHNIQUE FOR UROLOGICAL SURGERIES – A HOSPITAL BASED STUDY

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ABSTRACT

Background: Though General Anaesthesia has been the choice of Anaesthesia for performing various Urological surgeries from long time, Neuraxial Anaesthesia is also gaining popularity as a choice of technique over last few years. Our study was aimed to compare General Anaesthesia (GA) with Epidural Anaesthesia (EA)in patients posted for urological surgeries.

Materials & Methods: After getting approval from Institutional Ethics Committee (H) and informed consent from the patients and attendants, 80 no of patients of ASA I and II age between 18 to 60 years undergoing urological surgeries were grouped in two groups of 40 no of subjects in each. Group GA received conventional General Anaesthesia and Group EA received Epidural Anaesthesia with Ropivacaine 0.75% at a dose of 3mg/kg admixed with 1microgm / kg of Dexmedetomidine. The cardio respiratory parameters, surgeon's satisfaction, patient's satisfaction, onset and duration of block and side effects were observed and documented. The data collected were analysed using students t test and chi square test for parametric data and Mann – Whitney U – test for nonparametric data. Value of $p<0.05$ as considered statistically significant.

Results: The demographic data like age, sex, height, weight, bodymass index were comparable. The parameters like duration of surgery and anaesthesia were comparable. Postoperatively the VAS score was statistically significant at 60 minutes. The requirement of first rescue dose was significant statistically. Surgeon's satisfaction was comparable but the patient's satisfaction was significant statistically. Haemodynamic parameters like tachycardia, hypertension, bradycardia were statistically significant. Side effects like nausea, vomiting, headache were comparable statistically.

Conclusion: Epidural Anaesthesia can be a good alternative and equally effective in patients undergoing major urological surgeries. This procedure can be adapted more confidently in patients where General Anaesthesia is contraindicated.

Key words: Epidural Anaesthesia, Ropivacaine, Dexmedetomidine, General Anaesthesia, Urological surgeries.

INTRODUCTION

General anaesthesia has been accepted and preferred technique of choice in most of the renal and other urological surgeries but with various co-morbid conditions general anaesthesia can be risky. Also general anaesthesia itself carries a lot of complications along with the difficulties of change of patient position during urological surgeries. Post-operative pain management is also difficult to

manage with general anaesthesia. Therefore, anaesthesiologists have been searching for good alternative anaesthesia techniques. Regional anaesthesia along with adjuvants and sedative agents have been successfully used for various renal surgeries. The post-operative pain can be well managed with this technique. Epidural anaesthesia happens to be a standard procedure and it can be used not only during surgery but also to manage post-operative pain in a better way. Dexmeditomidine an alpha agonist can be a good choice as adjuvant with epidural anaesthesia. Keeping all these in mind a comparative observational study was undertaken in patients undergoing elective urological surgeries under conventional general anaesthesia and epidural anaesthesia with local anaesthetic and alpha adrenergic agonist as adjuvant. Here our aim was to compare surgical conditions, surgeons satisfaction introperatively and patient satisfaction in the postoperative period in the two groups. The hemodynamic parameters and other side effects associated with the two techniques were also evaluated.

MATERIAL AND METHODS

After getting approval from Institutional Ethics Committee (H) and informed consent from the patients and attendants, 80 no of patients of ASA I and II age between 18 to 60 years undergoing urological surgeries were included in the study and they were grouped in two groups of 40 no of subjects in each. Group GA received conventional General Anaesthesia and Group EA received Epidural Anaesthesia with Ropivacaine 0.75% at a dose of 3mg/kg admixed with 1microgm / kg of Dexmeditomidine. After a detailed pre- anaesthetic checkup the data were recorded. In the operation theatre intravenous access was secured with 18 G canula and preloaded with ringer lactate or normal saline solution. Standard monitoring was done with electrocardiography, pulse oximetry, noninvasive blood pressure and respiratory rate monitoring. In Group GA patients were premedicated with Inj .glycopyrolate 0.2mg IV ,inj.Ondensetron 4mg IV and Inj.Tramadol hydrochloride 1.5mg/kg body weight. Preoxygenation done, induced with Inj. Propofol 2mg/kg and atracurium 0.5 mg/kg and maintained with nitrous oxide and oxygen in ratio 40:60 with sevoflurane (1 MAC). An intravenous infusion of ketorolac 0.5mg/kg (upto 30mg) was given during surgery along with paracetamol infusion15mg/kg (upto 1000mg) for post-operative analgesia. Decurrarization with Inj. Neostigmine 0.05 mg/kg and glycopyrolate 0.01mg/kg intravenously. The patients were extubated after adequate recovery and kept in recovery room. The total time required for surgery and anaesthesia were noted and recorded. Post-operative side effects like headache, nausea, vomiting, respiratory depression, shivering and dry mouth were observed for and treated as and when required. The first dose of rescue analgesia and VAS score at 60 minutes were noted and recorded. Surgeon and patient satisfaction were also noted and recorded. In Group EA, all patients were administered with inj. Ondansetron 4 mg and inj. Pantoprazole 40mg IV. Under aseptic precaution the epidural was given at L2-L3 or L3-L4 intrathecal space introducing 18G tuhoy needle with loss of resistance (LOR) to air technique. Epidural catheter was introduced and secured. A test dose of 3ml of 2 % lignocaine was given through the catheter. After confirming a dose of 3mg/kg Ropivacaine as 0.75% solution upto a maximum of 150mg admixed with 1mcg/kg Dexmeditomidine was injected through the catheter into the epidural space. The sensory levels were checked with bilateral pin-prick method every 4 minute interval until sensory block till T10 level achieved. The motor block was achieved with modified Bromage scale (0- No block, 1- Inability to raise extended leg, 2- inability to flex knee and 3- inability to flex ankle and foot). Abdominal muscle relaxation was assessed by using the Rectus Abdominis Muscle (RAM)score 10,20 and 30 minutes after the injection, RAM was ranged from 0 to 5; 0, full motor activity and 5, full abdominal muscle relaxation. A minimum score of 3 as required for the surgery. The sedation level as assessed with observer's assessment of alertness scale (OAA/S) and were recorded just before the initiation of surgery and thereafter every 20 minutes during the surgical procedure. VAS score was seen at 60 minutes post-operatively. Post-operative analgesia was maintained with epidural top-ups with 0.2% ropivacaine. The cardio respiratory parameters, surgeon's satisfaction (included surgical field bleeding, immobility of patient, degree of muscle relaxation and quality of post-operative analgesia),patient's satisfaction(included pain or discomfort during surgery and in post-operative period), onset and duration of block and side effects were observed and documented. Hypotension taken as fall in blood pressure >25% of baseline, was treated with IV fluids and inj, mephentermine in aliquots of 3mg and bradycardia taken as decrease of heart rate >25% of baseline, treated with 0.3mg bolus of Atropine.

The data collected was tabulated in Microsoft Excel Worksheet. Results on continuous measurements have been presented as mean +/- standard deviation and compared using students t test. Discreet data have been expressed as number (%) and analysed using chi-square test. For non-paramteric data Mann- Whitney U-test has been used. For all analysis, the statistical significance was fixed at 5% level (p value <0.05).

RESULTS

Demographic data in both the group was insignificant statistically and comparable. [Table 1]
Duration of Surgery in both groups was statistically insignificant. [Table 2]
Total anaesthesia time was comparable in both the groups. [Table 3]
The mean time to return to Bromage degree 1 block in Group EA was 231.38+/-16.76 with a minimum range of 210 minutes to a maximum of 280 minutes. [Table 5]
In group EA RAM score was seen at 10,20 and 30 minutes. At 20-30 minutes all the patients had a RAM score of 3-5 signifying satisfactory abdominal muscle relaxation compared to the values at 10 minutes. [Table 7]
In group EA sedation score was seen by OAA/S (Observers assessment of alertness/sedation) scale and was found that all the patients had scores between 3-6. This signified that while all the patients were sufficiently sedated but were arousable. [Table 8]
While comparing VAS Score at 60 minutes in post-operative period in both the groups it was found that in Group EA patients were significantly pain free as compared to Group GA. [Table 9]
Mean time to first dose of rescue analgesia in group EA (as top up) was significantly lower compared to Group GA. [Table 10]
Surgeon satisfaction in both the groups were comparable ($p > 0.05$) while patient satisfaction was more in group EA over group GA($p<0.05$). [Table 11]
While comparing the intraoperative haemodynamic parameters in both the groups it was seen that group GA showed statistically significant cases of tachycardia($p<0.05$) and hypertension ($p<0.05$) along with higher cases of hypotension, but group EA showed more cases of bradycardia as compared to group GA. [Table 12]
When the side effect profile in both the groups were compared it was found that group GA showed statistically significantcases of nausea and headach ($p< 0.05$) while group EA showed statistically significant cases of dry mouth ($p<0.05$). All other side effects were comparable in both the groups but were higher in group GA. [Table 13]

Table 1: Demographic data

	GROUP GA	GROUP EA	P value
Age (in years)	40.25 +/- 14.76	43.08 +/- 13.07	0.374
Gender (M:F)	4 : 1	5.67 :1	0.556

Table 2: Duration of surgery

Group	Duration of surgery		P value
	Mean	S.D	
Group GA	107.75	26.84	0.185
Group EA	100.63	20.45	

Table 3: Total anaesthesia time

Group	Total anaesthesia Time		P value
	Mean	S.D	
Group GA	126.00	28.81	0.103
Group EA	135.25	20.72	

Table 4: Block characteristics in group EA patients

Initial and postoperative block characteristics	MEAN	S.D	RANGE (Min-Max)	
Onset of sensory analgesia at T10 level (min)	10.78	1.61	8	14
Time to complete motor blockade (min)	20.03	1.82	16	24
Mean time to two segmental regression (min)	163.21	30.38	130	210

Table 5: Modified Bromage Scale for Muscle Power of Leg Muscles in Group–Ea Patients

MODIFIED BROMAGE SCALE		NUMBER	PERCENTAGE
No Block	0	0	0.00
Inability to raise extended leg	1	0	0.00
Inability to flex the knee and	2	9	22.50
Inability to flex ankle and foot	3	31	77.50
TOTAL		40	100.00

Table 6: Maximum Sensory Block Level in Group–Ea Patient

SENSORY BLOCK LEVEL	NUMBER	PERCENTAGE
T4	7	17.50
T6	26	65.00
T8	7	17.50
TOTAL	40	100.00

Table 7: RAM test of Abdominal Muscles in Group EA patients

RAM SCORE		At 10 min after inj.		At 20 min after inj.		At 30 min after inj.	
		n	%	n	%	n	%
Able to rise from supine to sitting position with hands behind head	0	0	0.00	0	0.00	0	0.00
Can sit only with arms extended	1	18	45.00	0	0.00	0	0.00
Can only lift head and scapula off bed	2	22	55.00	0	0.00	0	0.00
Can only lift shoulders off bed	3	0	0.00	10	25.00	0	0.00
An increase in abdominal muscle tension can be felt during effort, no other response	4	0	0.00	26	65.00	1	2.50
Full abdominal muscle relaxation	5	0	0.00	4	10.00	39	97.50
TOTAL		40	100.00	40	100.00	40	100.00
P value		----		<0.001**		<0.001**	

***Fisher's Exact test; The P value is significant at 5% level of significance/**Compared to Baseline**

Table 8: OAA/S scale in Group EA patients

OAA/S Scale	SCORE	NUMBER	PERCENTAGE
Agitated	6	1	2.50
Responds readily to name spoken in normal tone (alert)	5	27	67.50
Lethargic response to name spoken in normal tone	4	10	25.00
Responds only after name is called loudly and/or repeatedly	3	2	5.00
Responds only after mild prodding or shaking	2	0	0.00
Does not respond to mild prodding or shaking	1	0	0.00
Does not respond to deep stimulus	0	0	0.00
TOTAL		40	100.00
Mean +/- S.D		4.68 +/- 0.62	

Table 9: VAS SCORE

VAS SCORE	Group GA		Group EA		P value
	n	%	n	%	
0 (no pain)	1	2.50	35	87.50	<0.001
1-3 (mild pain)	14	35.00	5	12.50	
4-6 (moderate pain)	16	40.00	0	0.00	
7-9 (severe pain)	9	22.50	0	0.00	
10 (worst imaginable pain)	0	0.00	0	0.00	
TOTAL	40	100.00	40	100.00	

***Fisher's Exact Test; The p-value is significant at 5% level of significance**

Table 10: Mean time to first requirement of Rescue Analgesia

Group	Time to first requirement of rescue analgesia		P value
	Mean	S.D	
Group GA	192.13	33.43	<0.001
Group EA	338.50	29.88	

***Student's t Test; The p-value is significant at 5% level of significance.**

Table 11: Surgical Satisfaction Score and Overall patient's Satisfaction

Grade of Satisfaction	Group GA		Group EA		P value
	n=40	%	n=40	%	
Surgeon:					
• Excellent	4	10.00	6	15.00	
• Good	28	70.00	30	75.00	
• Fair	4	10.00	2	5.00	0.614
• Poor	4	10.00	2	5.00	
• Patient:					
• Extremely Satisfied	1	2.50	5	12.50	
• Satisfied	33	82.50	34	85.00	
• Not satisfied	6	15.00	1	2.50	0.043#

Table 12: Intraoperative Haemodynamic Parameter

Haemodynamic Parameter	Group GA		Group EA		P value
	n	%	n	%	
Tachycardia	12	30.00	3	7.50	0.009#
Hypertension	10	25.00	2	5.00	0.012#
Hypotension	8	20.00	4	10.00	0.210
Bradycardia	3	7.50	6	15.00	0.288

Table 13: Side Effects/ Complications

Side effects/ Complications	Group GA		Group EA		P value
	n	%	n	%	
Hypotension	8	20.00	4	10.00	0.210
Nausea	8	20.00	2	5.00	0.042#
Respiratory Depression	7	17.50	2	5.00	0.076
Headache	5	12.50	0	0.00	0.020#
Shivering	4	10.00	2	5.00	0.395
Bradycardia	3	7.50	6	15.00	0.288
Vomiting	2	5.00	0	0.00	0.152
Dry Mouth	1	2.50	8	20.00	0.013#

DISCUSSION

Urological surgeries are one of the most common surgeries carried out nowadays. Surgery is themainstay of treatment for many urological conditions which are typically performed under GA. However there are a few limitations with GA which have been described in various studies. Although this technique provide the desired state of unconsciousness and relaxation, it does not eliminate the surgical stress response and is associated with various undesirable side effects such as nausea, vomiting, respiratory depression etc.

Epidural anaesthesia is a potent, inexpensive and safe technique that provides surgical anaesthesia along with post-operative pain control and also cuts off the surgical stress response. Addition of an adjunct to the local anaesthetic helps in providing better surgical anaesthesia and post-operative analgesia, with very little adverse effects.[1]

In our study, the demographic profiles (age, sex, weight, height), ASA status and duration of surgery were comparable and statistically insignificant (p value>0.5).

Our study was in alignment with BajwaSJ, Kaur et al,.[2] (2014) so far as the patient's satisfaction in the Intraoperative and post-operative period is considered. Maratha V, Kapil M et al,[3] (2016) was also found adequate safety with the regional anaesthesia.

In this study parameters in group EA like initial block characteristics (onset of sensory block at T10, time to complete motor blockade, highest level of sensory block achieved, Modified Bromage scale of muscle power of leg and RAM score) and post-operative block characteristics like (mean time to two segment regression, mean time to return to Bromage degree 1 block) were observed. Comparison was done between both the groups EA and GA in parameters such as (mean time to first dose of rescue analgesia, VAS score, sedation score, patient and surgeon satisfaction, hemodynamic parameters and side effects). We found the mean time for onset of sensory block at T10 level in group EA was 10.78±1.61minutes. Time to complete motor blockade was 20.03±1.82 and highest level of sensory block achieved was at level T4 but most patients had a block till level T6hich was in

accordance with the similar study done by Kaur S, Attri J et al,[4] and Gowri S et al.[5]

In a similar study Kaur S, Attri J et al,[4] (2014) used 150 mg of 0.75% ropivacaine in Group A and 150 mg of 0.75% ropivacaine with dexmedetomidine (1 microg/kg) in Group B for epidural anaesthesia for lower limb orthopaedic surgeries. It was seen that mean time taken for onset of sensory block to T10 dermatome in Group A was 14.182 ± 6.02 min and in Group B was 12.536 ± 4.172 min, time to complete motor block in group A was 27.34±5.970 and group B was 25.73±4.172 and highest level of sensory block achieved was T6 in group A and T5 in group B, which was in accordance with our study.

In another similar study Gowri S et al,[5] (2015) tried to ascertain the synergistic effect of adding dexmedetomidine to ropivacaine 0.75% in epidural anaesthesia for lower abdominal and lower limb surgeries. In control Group (R) (n = 50) 15ml of 0.75% ropivacaine and dexmedetomidine Group (RD) (n = 50) 15ml of 0.75% ropivacaine plus 0.6mcg/kg of dexmedetomidine was used. They found that in in group R mean time of onset of sensory blockade is 10.04±2.5 mins while in group RD it was 5.26±1.49mins (T10). Time to complete motor blockade was 15.36±3.28 mins in group R and 11.22 and 2.61 mins in groupRD, while maximum level of sensory block achieved in group R is T6 and in group RD it was T5 which is in accordance with our study.

In our study Modified Bromage scale of muscle power of leg in group EA was satisfactory in all the patients where out of 40, 31 patients had a score of 3 and 9 patients had score of 2 signifying complete relaxation in leg muscles.

Gowri S et a,[5] (2015) also found that more intense motor blockade as per modified Bromage scale was seen in patients in group with dexmedetomedine as adjuvant than compared to patients with ropivacaine alone, the p value being 0.001 hich is similar to our study.

In another study Giri RS, Iqbal MM et al,[6] (2013) found that Modified Bromage scale 3 was achieved earlier (17.24 ± 5.16 min) in patients who were administered dexmedetomidine as adjuvant as compared to ropivacaine alone concurring our study.

RAM score for Rectus Abdominis

RAM score was seen at 10,20 and 30 minutes in group EA. At 20-30 mins all the patients had a RAM score of 3-5 signifying satisfactory abdominal muscle relaxation required for surgery. Complete motor blockade was achieved at 20.03±1.82 mins in our study.

Similar such studies done by Bajwa SJ,Kaur J et al2 (2014) and Maratha V,Kapil M et al,[3] (2016) showed RAM score between 3-5 with satisfactory muscle relaxation with an average time within 20 mins to complete motor blockade. Their findings were in accordance with our study.

Mean time to two segment regression

Mean time to two segment regression in group EA was 163.21±30.38 in our study.

In similar studies by Bajwa SJ, Kaur J et al,[2] (2014) it as seen that mean time to two segment regression was 147.74±12.2, and Rastogi B, SinghVP et al,[7] (2015) found that time taken for two segment dermatomal regression was 262.38 ± 58.34 (min) in accordance to our study.

Mean time to return to Bromage degree 1 block Mean time to return to Bromage degree 1 block in group EA was 231.38±16.76 in our study.

In similar studies by BajwaSJ, Kaur J et al,[2] (2014) found mean time to return to Bromage degree 1 block was (min) 224.54±27.82 in accordance with our study.

OAA/S (Observers assessment of alertness/sedation) scale

OAA/S (Observers assessment of alertness/sedation) scale and was employed to check sedation in group EA due to the effect of dexmedetomedine, majority of the patients had scores between 3-5. This signified that while all the patients were sufficiently sedated but were arousable. There was no need for IV sedation in group EA. This parameter couldn"t be compared as the other group was given GA.

In a similar study byBajwaSJ, Kaur J et al,[2] (2014) majority of the patients in Group E had a score of 3 or 4 onOAAS/S.

VAS Score in both groups

While comparing VAS Score at 60 minutes in post-operative period in both the groups it was seen that around 70% of the patients in group GA had mild to moderate pain (score 4-6) while above 20% experienced severe pain (score 7-9) as against group EA where near to 90% patients experienced no pain (score 0) and only 12.50% patients experienced mild pain (score 1-3). This was statistically significant ($p < 0.001$).

Similar such study by Pu C, Wang J et al,[8] (2015) showed lower mean VAS score in the RA group than in the GA group at 24 h after surgery. Also Kumawat T, Kothari V et al,[9] (2019) in their study found that post-operative VAS scores were higher in group GA than in group RA 24 hrs after surgery.In yet another study by Dogan R,Erbek S et al,[10] (2010) it was seen mean postoperative VAS scores were 4.5±1.54 cm in the GA group and 1.8±1.4 cm in the LAD group, and the difference between the groups was statistically significant ($P<0.001$).

Mean time to first dose of rescue analgesia in both groups

Mean time to first dose of rescue analgesia in group EA (in the form of top up) was 338.50±29.88 while in group GA (as i.v) it was found to be 192.13 ±33.43 which was statistically significant ($p<0.001$).Pathak V, Kushwaha B et al,[11] (2018) in their study found that the time for rescue analgesia was shorter for group C (only bupivacaine) than group A and B, it was prolonged in Group B (dexmedetomedine) than Group A (clonidine).

Surgeon and Patient Satisfaction

In our study surgeon satisfaction in both the groups were comparable ($p >0.05$) The surgical conditions were good in majority of the patients in both groups.

However, the patient satisfactory scores were significantly higher in Group EA as compared with Group GA on overall statistical evaluation ($p<0.043$).

Similar study byBajwaSJ, Kaur et al,[2] (2014) showed that while surgeon satisfaction was comparable in both group G and group E the patient satisfactory scores were significantly higher in Group E as compared with Group G ($P = 0.038$),which is in accordance with our study.

Intraoperative haemodynamic parameters in both the groups

While comparing the intraoperative haemodynamic parameters in both the groups it was seen that group GA showed statistically significant cases of tachycardia ($p<0.05$) and hypertension ($p<0.05$) along with higher cases of hypotension mainly during intubation and extubation, but group EA showed more cases of bradycardia as compared to group GA.

In another study Maratha V, Kapil M et al,[3] (2016) while comparing the heart rate and blood pressure during surgery in both the groups as compared to baseline found no statistically significant changes except during two stressful periods in GA,of intubation and extubation. This was in accordance with our study.

Side-effects:

When the side effect profile in both the groups were compared it was found that group GA showed statistically significant cases of nausea and headach ($p< 0.05$) while group EA showed statistically significant cases of dry mouth ($p<0.05$). All other side effects were comparable in both the groups but were higher in group GA.

In study similar to ours BajwaSJ, Kauret al,[2] (2014) found that fewer side effects were observed in Group E as compared with Group G. Nausea and vomiting, respiratory depression and shivering were observed more frequently in Group G patients. However, the incidence of dry mouth was much higher in Group E patients as compared with Group G patients which was highly significant ($P < 0.001$). This was in accordance with our study

CONCLUSION

On the basis and findings of our present study, we can come to the conclusion that lumbar epidural block for urological surgeries(RA) can be considered as a good alternative to GA and is as effective. It is also a safer option as it provides better Intraoperative hemodynamic stability without any major side effects. Epidural block with catheter in situ provides better postoperative analgesia when compared to GA. It also has lesser complication and side-effects which resulted in significant patient satisfaction in group EA over group GA in our study. This procedure can be adapted more confidently in patients with comorbidities where General Anaesthesia is contraindicated.

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