A STUDY TO ASSESS THE USEFULNESS OF TRANSVERSUS ABDOMINIS PLANE BLOCK AS SOLE ANAESTHETIC FOR DAY CASE BILATERAL HERNIA SURGERY ALONG WITH DEXMEDETOMIDINE INFUSION AND LOCAL INFILTRATION

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ABSTRACT

BACKGROUND

Hernia surgeries are usually done as day case without the need for admission to hospital. Several anaesthesia techniques are used like general anaesthesia, spinal anaesthesia, local infiltration, etc. Here we used combinations of TAP block and sedation to do the surgeries with good operating conditions.

Aim- To study the usefulness of TAP block as a sole anaesthetic technique for day case hernia surgery along with dexmedetomidine infusion.

MATERIALS AND METHODS

Settings and Design- Sree Gokulam Medical College and Research Institute, Venjaramoodu, Thiruvananthapuram, Kerala, India for a period of one year from 1st May 2015 to 31st April 2016.

45 ASA I-II patients were subjected to hernia surgery under TAP block using USG with 20 mL of Sensorcaine 0.25% along with fentanyl bolus 100 mcg and dexmedetomidine infusion of 0.5 mcg/kg/hour following bolus of 1 mcg/kg till the end of the surgery. USG was used to perform all the blocks. Only the blocks that were effective were included. The rest were converted to GA and excluded from the study. Patient's vitals were monitored and pain was assessed postoperatively using VAS scale. Rescue analgesia was given when the VAS scale was >4 using paracetamol or tramadol. Patients were discharged after eight hours once they have voided.

Statistical Analysis- Statistical analysis was done using Microsoft Excel. Mean score and standard deviation were calculated. Proportion and percentages were calculated for categorical variables.

RESULTS

TAP block is useful as an anaesthetic technique for day case hernia surgery.[1] Dexmedetomidine bolus and infusion helps to improve patient comfort and suppresses the visceral component of pain during herniorrhaphy.

CONCLUSION

Hernia surgeries can be safely done using TAP plane block and sedation. The advantage of long duration of analgesia gives patient the comfort of early discharge and less need for supplemental opioids. Absence of motor block is also advantageous with early mobilisation and voiding.

KEYWORDS

Transversus Abdominis, Hernia, Local Anaesthetic, Dexmedetomidine, Visual Analogue Scale, Petit Triangle.

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BACKGROUND

TAP plane block is commonly used for postoperative pain relief in lower abdominal surgeries like caesarean sections, hysterectomy and hernia, etc.[1] Traditionally, it was done as a blind procedure using blunt needle and feeling for the boundaries of Petit triangle and later feeling for two pops when the fascia of external oblique and internal oblique is penetrated.[2]

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Rafi et al used single pop at the Petit triangle to identify the space. With the use of ultrasound in anaesthesia it is possible to deposit local anaesthetic in the TAP plane accurately making the block successful and effective in lots of abdominal surgeries even in obese patients with high success rate.[2] TAP plane block is used to produce analgesia to parietal peritoneum, muscle and skin for spinal segments T10–L1[2] and higher depending on the volume of drug administered.

The block is considered safe as it has no major haemodynamic effects following administration. When performed with ultrasound the plane can be accurately identified. Patients with cardiac disease, COPD, aortic valve diseases, elderly, renal diseases, etc. can be given TAP block without major problems. Post-procedure complications like nausea, vomiting, urinary retention were lower when compared to spinal or general anaesthesia that are commonly given for hernia surgeries. Patients with contraindication for central neuraxial block also may be given this block due to low

complication rates associated with this block. Other advantages of TAP block are no need for hospital stay, no need for large volume of IV fluids postoperatively to prevent headache, etc.

Urinary retention, difficulty in walking, haemodynamic changes, nausea, vomiting were closely monitored and found to be rare in patients who were given TAP block. Patients who are given TAP block could be mobilised easily, with less postoperative pain medications, easily voided and discharged earlier than normal when compared with cases operated under routine spinal anaesthesia or general.

Objective

Objective of the study is to assess the usefulness of TAP plane block and dexmedetomidine infusion as sole anaesthesia for day-case hernia surgeries.

MATERIALS AND METHODS

An observational study was conducted among patients undergoing inguinal hernia surgery using TAP block at Sree Gokulam Medical College during 1st May 2015 to 31st April 2016. The study was approved by the ethical committee of Sree Gokulam Medical College prior to commencement. Informed consent was obtained from patients. Only ASA I and II patients were included in the study.

Inclusion Criteria

- ASA PS I or II.
- Age 40-60.
- Male sex.
- No history of allergy to local anaesthetics or any of the drugs used.
- No infection at the point of injection.
- Patients willing to undergo procedure under TAP block.

Exclusion Criteria

- Patient's refusal.
- Psychiatric patient.
- Major Coagulation abnormalities.
- Major systemic diseases like heart disease, lung disease.
- Very large hernia.
- Complicated hernia.

MATERIALS AND METHODS

All patients are subjected to preoperative assessment in anaesthesia clinic and only ASA I and II were included in the study. Routine preoperative investigations were done like, total and differential count, blood sugar, ECG, x-ray chest, bleeding time, clotting time. Patients were fasted overnight, premedicated with ranitidine 150 mg, alprazolam 0.5 mg previous night and on the day of surgery. The patients were familiarised with visual analogue scale (VAS) for pain scoring. Standard patient monitors during anaesthesia were attached like ECG, NIBP, SPO2, capnography. Preoperative midazolam 2 mg was given and fentanyl 100 mcg IV. Just prior to administering the block, dexmedetomidine bolus 1 mg/kg followed by infusion of 0.5 mg/kg/hr. was started. TAP block is given with 20 mL of 0.25% bupivacaine on each side with ultrasound guidance. After half an hour, following onset of sensory block, 10 mL of 2% lidocaine with adrenaline local anaesthetic is infiltrated by the surgeon along the line of incision. During procedure patient is sedated with dexmedetomidine infusion in the intraoperative period. Patient's vitals are recorded at regular intervals and up to 480 minutes postoperatively. Cases in which blocks failed were converted to general anaesthesia with LMA and were excluded from the study. Intraoperative adverse events were recorded like vomiting, breath holding, bradycardia, hypotension, etc. Postoperative pain was assessed for 480 minutes using VAS scale and also recorded before sending the patient home after the procedure. IV Ringer lactate was started intraoperatively and continued post-operative till patient could tolerate oral fluids. The time of first rescue dose of analgesic was noted. The duration of total analgesia was noted. When the patient complained of moderate pain in the visual scale greater than 5, rescue analgesia was given. Analgesia duration was measured from time of establishment of block till patient is discharged home by PACU nurse and recorded. Data was analysed using Microsoft Excel. Mean score and standard deviation were calculated. Proportion and percentages were calculated for categorical variables.

RESULTS

The mean age of the study participants was 51.83 ± 5.45 years. The mean weight of the participants was 63.4 ± 7.80 Kg.

Age in Years	Number of Patients	Percentage of Total
40-50	21	46.7
51-60	24	53.3
Total	**45**	**100**
Mean ± SD	51.83 ± 5.45	

Table 1. Age Distribution of Patients

Weight in Kg	Number of Patients	% of Patients in each Group
<50	4	10%
50-60	15	30%
61-70	25	56.7%
>70	1	3.3%
Total	**45**	**100%**
Mean ± SD	63.4 ± 7.80	

Table 2. Weight Distribution of Patients

Comorbidity	Yes	No	Percentage of Patients with comorbidity
Hypertension	3	42	
Diabetes	1	44	2.2
Bronchial asthma	13	32	28.8

Table 3. Comorbidity within the Group

ASA Physical Status	Number	Percentage
ASA PS I	23	51.1
ASA PS II	22	48.9
Total	**45**	

Table 4. ASA Physical Status of Patients

VAS Score	Mean Duration	Standard Deviation	Standard Mean Error
VAS 0	439.78	73.685	10.984
VAS 4	548.22	86.610	12.911

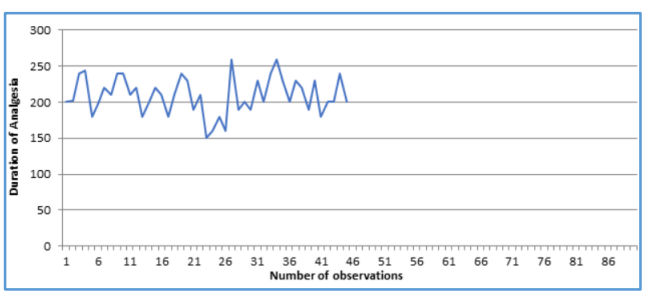
Table 5. Duration of Postoperative Analgesia Following TAP Block

No	37	82.2%
Yes	8	17.0%
Total	**45**	**100%**

Table 6. Incidence of Postoperative Nausea and Vomiting

MAP (mmHg)	
Pre-operative	92.50 ± 6.58
1 min.	75.87 ± 4.02
5 min.	75.10 ± 3.61
10 min.	80.73 ± 4.36
15 min.	84.83 ± 3.15
30 min.	86.43 ± 3.52
60 min.	84.90 ± 3.18
90 min.	85.27 ± 5.28
120 min.	83.83 ± 3.66

Table 7. Mean Arterial Blood Pressure during Procedure



VAS Score 0 Duration in Minutes

DISCUSSION

TAP block or transversus abdominis plane block is a common abdominal field block done for postoperative pain relief for both lower abdominal and upper abdominal surgery by different techniques. Usual techniques are by using anatomical landmarks, USG and under vision by the surgeon. Here we applied TAP block for intraoperative anaesthesia using USG supplemented with dexmedetomidine infusion and incision site infiltration with local anaesthetics. The surgery was commenced after 30 min. after establishment of sensory block. 45 patients were subjected to hernia surgeries with TAP block and incision site infiltration with lidocaine 2%. All surgeries went uneventful, with analgesia lasting in the postoperative period. The average duration of postoperative analgesia was a mean of 627.11 minutes with SD of 118.237 and standard error of 17.625, no major complications were observed and the need for postoperative morphine was less and postoperative nausea and vomiting was less than expected.

TAP plane block first described by Kuppuvelumani et al in 1993 and formally documented by Rafi et al in 2001 is used to manage surgical pain by injecting local anaesthetic in between internal oblique and transversus abdominis plane. It was traditionally done as a blind procedure in the Petit triangle, bounded by latissimus dorsi posteriorly, iliac crest inferiorly and external oblique aponeurosis medially. The needle is advanced at the apex of the triangle with feel for one pop as described by Rafi et al and later by feeling for two pops one of external oblique and another for internal oblique before it is deposited in the plane between transversus abdominis and internal oblique as described by McDonnell and his colleagues. They demonstrated its utility in retropubic prostatectomy.[3,4]

Usually 20-25 mL of local anaesthetic is deposited. Commonly used preparations are Ropivacaine 0.2%, Bupivacaine 0.25%, and 0.375% Ropivacaine, and 0.5% Ropivacaine by different authors. The actual spread of local anaesthetic is not clear yet. Studies in cadaver and human volunteers suggests that 20 mL of local anaesthetic spread from costal margin to iliac crest exerts a complete sensory block of abdominal wall. Some authors have shown only limited spread of local anaesthetic to segments T10 level. Rosen WM et al in a review redefining the course of the thoracolumbar nerves in 2008 has described the innervation of the anterior abdominal wall. The TAP is a fascial plane between internal oblique and transversus abdominis, it exists as a continuous plane at any point in the abdomen where the two innermost muscle layers exist. The nerves running in the TAP originates strictly from T9-L1 nerve segment. USG was first described by Hebbard P et al, Tran TMN et al in review in 2009 on the spread of local anaesthetic in TAP block in cadaver using dye found the spread limited to T10-L1 dermatomes, when local was injected in cephalic to caudal direction in the posterior TAP plane. Similar spread was described by Hibbard Shibata and colleagues in gynaecological laparoscopic surgeries in 26 patients using ultrasound guidance and they suggested lower abdominal surgery as the main use for TAP block. In contrast, a study by McDonnell and colleagues reported a sensory block up to T7 to L1 in volunteers when landmark technique was used and TAP block was done through Petit triangle using 25G blunt needle.[5,6,7] In another randomised trial, TAP block was used successfully for large bowel surgery with midline incision with reduction in morphine requirement postoperatively.[8]

The path of ilioinguinal nerve is subjected to variability in position, it penetrates the transversus abdominis muscle and enters the TAP plane in different places in relation to the anterior iliac crest. In 24 out of 244 specimens dissected, the ilioinguinal nerve joined the TAP only at the anterior 20% part of the iliac crests as reported by Shibitay et al in a review. The analgesic efficacy of transversus abdominis plane block after caesarean section[9] in an RCT, done by McDonnell JG et al observed that TAP block was useful as multimodal analgesia and produced superior analgesia than placebo up to 48 hrs. and patients required less morphine post-operative.[10] In another study done by EL-Dawlatly AA et al,[11] 42 patients were randomised to receive either TAP block of 15 mL of bupivacaine on each side or placebo, pain was substantially reduced and requirement for morphine postoperatively in TAP group. Rafi et al in 2012 described that variable results were due to failure in technique in administering the local in correct plane, he described a single pop of technique at the Latissimus dorsi–iliac point, and renamed the TAP block as LIP block or Latissimus dorsi-iliac point block.[12] Carney J et al used ipsilateral TAP block for appendectomy in children and found it to be effective.[13] Sivapurapa et al used 0.25% bupivacaine at 0.6 mL/kg for TAP block in 20 patients and found it superior to local anaesthetic infiltration in inguinal hernia.

Venkataraman R et al used 0.2% ropivacaine 20 mL and normal saline in 60 patients and observed no difference in VAS scores at 0, 2 and 24 hours between the two groups, but there was a reduction in pain at 4, 6, 12 hours with reduction in VAS scores.[14] Sukhyanti Kerai et al reported two cases of laparotomy and hernia surgery done for high risk patients with TAP block and IV Dexmedetomidine. Some authors describe the low success of the block due to the wrong plane of deposition with blind technique and only 23.6% were deposited in correct plane. It was concluded by Carney et al that the pattern of local anaesthetic spread differs with the site of deposition, the posterior approaches resulted in more posterior spread around the quadratus lumborum to the paravertebral space from T5 to L1 and anterior spread of local was more with anterior approaches.[15] Others have argued that the difference in spread was related to anatomical variations and not due to place of injection alone and the spread noticed by dye in cadavers was not the true spread in actual real life situations. In a study by EL Sersi et al, they found the efficacy of block to be more with ultrasound techniques than land mark technique and the correct placement of needle using USG may be the reason.[16] Rafi et al suggested the needle placement or puncture site 2.5 cm behind the highest point of iliac crest, especially in obese patients where triangle of petit cannot be easily identified in landmark technique. He used 50 mm needle and appreciation of two pops for administering the block. Hosgood SA et al demonstrated superior analgesia with TAP block compared to placebo for live donor nephrectomy.[17] Several case reports have shown better intraoperative haemodynamic stability in high risk patients when given TAP block.[18,19] Continuous catheter is used for continuous postoperative pain in areas with minimal resource for pain management.[20] Various reports of its usefulness in total abdominal hysterectomy, cholecystectomy,[21] liposuction,[22] hernia,[23] iliac crest grafts,[24] post-caesarean section[25,26] are available. Usefulness of TAP block in paediatric patients are also reported.[27] Incidence of any major complications are rare but rare reports of visceral injuries have been reported.[28]

CONCLUSION

TAP block with supplemental IV sedation and incision site infiltration is an effective anaesthetic technique for bilateral hernia surgeries.[29] Use of ultrasound and better understanding of correct plane of deposition makes the block more successful. Though widely used many more research studies and clear understanding may make the block more successful in future. Supplementation with dexmedetomidine would take care of the visceral component of pain that is spared in TAP block.

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