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PRONE VENTILATION – OUR EXPERIENCE IN ICU PATIENTS

S Moied Ahmed[1], Ankur Varshney[3], S. Ali[2], S Bano[1]

ABSTRACT

Prone ventilation has been used in various surgical procedures for optimal operative access. But prone ventilation in ICU for diseases like ARDS has not been used so frequently. However, recently due to the upcoming disease process leading to refractory hypoxia its role has been justified. It is associated with various physiological changes along with number of complications and hence safe practice of prone ventilation requires clear understanding of both the issues. The aim of this case series, with review of 5 cases of H1N1, is to discuss the efficacy of prone ventilation in ICU, its physiological changes and complications, and how these complications may be anticipated and minimized.

Key words: Prone ventilation, H1N1 influenza, ARDS

INTRODUCTION

Acute respiratory distress syndrome (ARDS) is characterized by radiographical diffuse bilateral infiltrates, decreased respiratory compliance and severe hypoxaemia.[1]The primary aim is to treat life threatening hypoxemia and improving the respiratory mechanics. To achieve this, it is important that an appropriate means of ventilator support should be selected which results in minimal adverse effects of mechanical ventilation. Various guidelines have been proposed for the management of ARDS in which ards.net guidelines remains to be most popular. Despite strictly following the guidelines ARDS is one of the leading causes of mortality in ICU patients and it ranges between 30 – 50 %.[2-4]

Prone position has been a useful method of ventilation in hypoxic patients not responding to conventional supine ventilation with ards.net strategy.[5,6]

However, there are few studies in the literature supporting the effectiveness of prone ventilation in ARDS.[5,6]

The aim of this case series-cum-review is to discuss the efficacy of Prone ventilaton in ICU, its physiological changes and complications, and how these complications may be anticipated and minimized.

We are presenting five H1N1 influenza positive cases with severe ARDS. The patients were initially ventilated with conventional ARDS.Net strategy. Prone ventilation was implemented when they did not respond to the conventional strategy.

What does prone ventilation do?

Various studies have shown improvement in oxygenation of ARDS patients when made prone from supine. However physiological mechanisms involved in improving oxygenation has not been clearly understood. Following physiological changes have been advocated in improving the

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ventilation perfusion mismatch leading to improved oxygenation in severe ARDS patients who are ventilated in prone ventilation.

1. The most consistent finding when the patient is made prone is a relative increase in functional residual capacity (FRC) however there is little or no change in forced vital capacity and forced expiratory volume in 1 s (FEV1).[7]Coonan and Hope in a study have found that change in FRC in a patient going from upright to prone is approximately 12% which was considerably less as compared to patient going from upright to supine which was 44%.[8]

2. Lung perfusion is more uniformly distributed when patient is made prone as compared with the supine position. But recent studies has shown that in ARDS patients although perfusion is more homogenous but it still remains more in dorsal region.[9]

3. There is redistribution of lung ventilation. Lung density decreases in dorsal region when patient is made prone thus there is more homogenous distribution of alveolar inflation and ventilation. Perfusion remains to be more in dorsal region thus this leads to decrease V/Q mismatch with a consequent improvement in oxygenation.[10]

4. Ventilator Associated Lung Injury[11,12]was found to be less in the prone than in the supine position . Also it has a more homogeneous distribution in prone ventilation. Thus prone positioning can exert a protective effect on the mechanically ventilated injured lung.

5. Application of PEEP and recruitment maneuvers seems to be more effective in the prone position. There is uniform expansion of the lung in the prone position when PEEP is given. This effect also lasts longer in the prone position.[13]

When is prone position instituted?
Prone position should be instituted in the following conditions –

- When high PEEP (> 15 cm H2O) is required with high FiO2 (> 60%) to achieve a PaO2 = 60 mm Hg
- To prevent oxygen toxicity
- To prevent barotraumas

How to assess the response to prone ventilation?

- Response to prone was initially considered as positive when the increase in PaO2 was more than 10 mm Hg after 30 minutes. However, presently the definition has been broadened to include an increase in PaO2/FiO2 ratio of more than 20 or 20% within 2 hours of the patient being turned. Usually the PaO2 rise by about 100 mm Hg in responders in 2 hours.
- Non-responders are those in whom PaO2 was unchanged or decreased in clinically and statistically insignificant amounts after turning prone.

How long to ventilate in prone position?
There is no consensus regarding the duration of prone ventilation. In case of responders the duration varied between 2 – 30 hours in various studies. Some clinicians leave the patients in prone for as long as possible, and turning them supine for at least 4 hours a day so that the procedures possible only in supine position can be undertaken and also to assess the skin condition and the pressure areas. It is said that prone position can be of some benefit if it is maintained for at least 20 hours a day.

When should a patient be considered intolerant to prone position?
The patient should be considered intolerant to prone position if –

- The SpO2 decreases by 5%
- The mean arterial pressure decreases by 25 mm Hg
- Presence of cardiac arrhythmias

What are the disadvantages of prone ventilation?

- Difficulties in physical examination
- Difficulties in toileting and nursing care
- Management of emergency situations like cardiac arrest and accidental extubation are very difficult
- Pressure sores on face, eyes, breasts etc.
- It is difficult to institute in patients with fractured ribs, pelvis, long bones, and those with external fixators
- It might require frequent turning to avoid desaturation

What are the complications of prone ventilation?

- Prone ventilation is not devoid of complication. There are numerous potential risks which limit its utilization in nearly all ICU setting. Accidental extubation, pulling of lines, kinking of endotracheal tubes and formation of pressure sores etc[14] are some of the inevitable complications. Therefore prone ventilation mandates special monitoring and nursing care so as to avoid these complications.
- Critical events – cardiac arrests, compression of anterior chest tubes leading tension pneumothorax.
- Clinical problems – reversible dependent edema of the face (forehead, eyelids, conjunctiva, lips and tongue) and anterior chest wall, aspiration of enteral feeds on turning to supine
- Patient injuries – pressure ulcers, corneal ulcers

How to prevent complications?

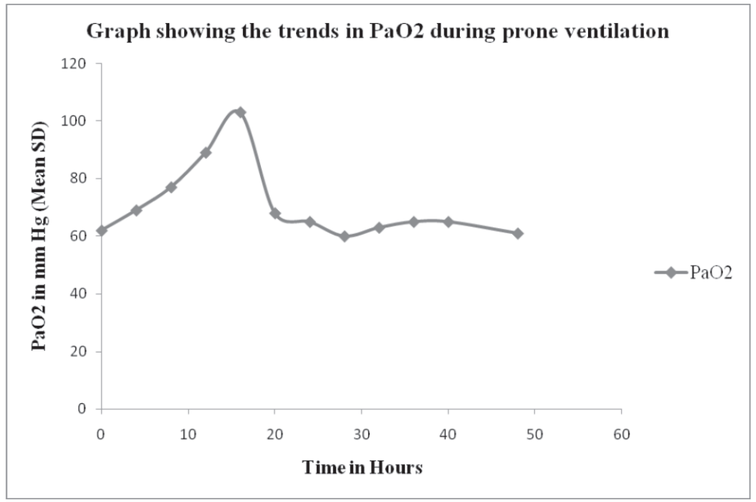
- Secure the ETT before turning
- Disconnect / secure IV lines, all other tubes and catheters
- Take measures to maintain skin integrity – avoid pressure on the eyes and bony prominences, change position every 2 hourly
- Keep the head end elevated 10° to avoid facial edema.
- Avoid non-physiological movement of the patients extremities during change of position.
- Place the patient in physiologically neutral position that avoids extension or flexion of the patients cervical spine and adduction or abduction of extremities. The recommendation are – 1) positioning one arm up and one arm alongside the body while turning the patients head toward the upper arm, 2) alternating the patients arm position every 2 hourly, 3) providing physiotherapy

OUR EXPERIENCE
We have recently utilized prone ventilation in our ICU in 5 H1N1 patients and have found that prone ventilation significantly improved oxygenation in all patients when supine position failed to do so. All 5 patients were severe ARDS when they presented to us. The patients were initially ventilated in supine according to ards.net strategy for 24 hours. However there was no improvement in PO_2 of these patients rather it was decreasing with time. After approximately 24 hours of supine ventilation, we made them prone and ventilated them for 18 hours. Subsequently they were reverted to supine position to avoid complications associated with prone ventilation. There was significant improvement in oxygenation of these patients as shown by increasing trend of their PO_2 and SpO_2 (figure 1). Despite initial improvement of oxygenation 4 patients subsequently developed refractory hypoxemia and expired. Only 1 patient survived in whom prone ventilation was implemented right from the time the patient presented to us.

However, our limitation was that the staffing was not as per the requirement for prone ventilation. This prevented us from maintaining prone ventilation for a prolonged period.

Previous studies[15,16] have also shown improvement in oxygenation with prone ventilation but the overall mortality did not

Figure 1 showing the graphical presentation of trends in PaO2 following prone ventilation



decrease. It could be probably due to small sample size in those studies. A large scale multicentre study is needed to evaluate the effectiveness of prone ventilation in ARDS patients. We are of the opinion that prone ventilation improves oxygenation in patients when supine ventilation fails to do. If initiated early in the disease it may lead to decrease in mortality.

CONCLUSION

Hence we conclude that prone ventilation improves oxygenation in ARDS patients by improving the respiratory mechanics and V/Q mismatch. The improvement is significant in the initial period of prone ventilation and probably in the early phase of the disease when it is still lobar and segmental and not diffuse. Since it is inexpensive it should be instituted early when the disease is still segmental. However, despite its benefits it has limitations. A coordinated team effort and 1:1 staff and patient ratio is mandatory to avoid the adverse events and obtain better outcome. A standard protocol should be framed in every ICU so that it can be implemented in desired patients in a safe manner.

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ULTRASOUND GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK WITH ROPIVACAINE IN TWO CONCENTRATIONS FOR LOWER ABDOMINAL LAPAROSCOPIC SURGERIES: A COMPARATIVE STUDY ON POST- OPERATIVE PAIN RELIEF

Sandeep Arora[1], Saurabh Joshi[2], Sabih Ahmad[3], S.P. Singh[4], U.K. Valecha[5]

ABSTRACT

BACKGROUND: The transversus abdominis plane (TAP) block is usually performed by landmark-based methods. This prospective, randomized study was designed to compare the postoperative analgesic efficacy of ultrasound-guided bilateral TAP block with ropivacaine 0.2% vs ropivacaine 0.375% 20 ml on each side of midline; in patients undergoing lower abdominal laparoscopic surgeries under general anaesthesia.

METHODS: Eighty patients undergoing lower abdominal laparoscopic surgeries were randomized to receive ultrasound-guided bilateral TAP block either with ropivacaine 0.2% (Group 1, *n*=40) or with ropivacaine 0.375% (Group 2, *n*=40) after induction of general anaesthesia. A linear ultrasound probe with in-plane needle placement was used to inject 20 ml of drug on each side. Postoperative pain relief, patient satisfaction scores and opioid consumption were recorded.

RESULTS: Ultrasonographic visualization of the relevant anatomy, detection of the shaft and tip of the needle, and the spread of local anaesthetics were possible in all cases where a TAP block was performed. Patients in Group 2 had significantly lesser postoperative opioid consumption and better patient satisfaction compared with those in Group 1 [mean dosage 54.24±15.213 µg (Group 1) *vs* 44.21±15.39 (Group 2) µg, *P*=0.027; and, 1.5±0.506 (Group 1) vs 2.1±0.81 (Group 2)].

CONCLUSIONS: Ultrasonographic guidance enables exact placement of the local anaesthetic for TAP blocks. In patients undergoing lower abdominal laparoscopic surgeries,ultrasound-guided bilateral TAP block with 0.375% ropivacaine had better postoperative pain relief and satisfaction scores compared to 0.2% ropivacaine.

KEY WORDS: ultrasound-guided bilateral TAP block, ropivacaine, laparoscopic surgeries.

INTRODUCTION

The transversus abdominis plane (TAP) block is a new, rapidly expanding regional anaesthesia technique that provides analgesia following abdominal surgery. Introduced 10 years ago in Ireland, when there were a lack of facilities and staff for acute postoperative pain treatment, it became increasingly popular and spread worldwide because of its relative simplicity and efficacy. TAP block significantly reduces pain associated with lower abdominal surgery, regardless of whether it is used as the primary anaesthetic or a measure for postoperative pain control.

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The TAP block involves a single large bolus injection of local anaesthetic into the TAP, an anatomical space between the internal oblique (IO) and transversus abdominis (TA) muscles.[1] The anterior border of TAP is linea semilunaris, which consists of the aponeurosis of IO and EO muscles and the TA muscle, and extends from the cartilage of rib 9 to the pubic tubercle.[2]The superior border of the TAP plane is the subcostal margin, from the cartilages of the 9th to 12th ribs continued into the border of the latissimus dorsi (LD) muscle and the lumbar triangle of Petit (LTOP). The inferior border is the inguinal ligament, iliac crest and posterior border of LTOP.[3] The TAP thus provides a space where local anaesthetic can be deposited to achieve myocutaneous sensory blockade. The sensory supply of the skin, muscles and parietal peritoneum of the anterior abdominal wall is derived from the anterior rami of the lower six thoracic nerves and the first lumbar nerve. The intercostal, subcostal, iliohypogastric and ilioinguinal nerves course through the lateral abdominal wall within the TAP before they pierce the musculature to innervate the abdomen.[4] There is extensive branching of and communication between nerves within the TAP. [5]

MATERIALS AND METHOD

The study was conducted in the department of anaesthesia in our hospital after approval by hospital ethical committee. Eighty patients were enrolled in the study. Subjects were grouped into two groups: group I (ropivacaine 0.2%) and II (ropivacaine 0.375%), with 40 patients in each. Patients were randomized into two groups of 40 patients each by sequence using numbered opaque envelopes containing treatment allocations.

Patient with unstable cardiovascular diseases, respiratory diseases, hepatic diseases, uncontrolled diabetes mellitus, morbid obesity, age less than 18 years or more than 60 years, allergic to local anaesthetic and USG gel, patients with chronic pain, drug or alcohol abuse, patients with psychological disorders, and ASA (American society of anesthesiology) status of more than II; were excluded from the study.

It was ensured that patient did not receive ropivacaine exceeding recommended dose of 3 mg/kg of body weight. In this study none of our patient was below 50 kg.

During pre anaesthesia evaluation they were explained and demonstrated the Numeric Rating Scale seeking their co operation and consent. Routine pre-operative preparation consisted of fasting for 6-8 hrs prior to surgery. Patients were premedicated with Tablets Alprazolam 0.25mg, ranitidine 150mg and metoclopramide 10mg. after application of routine monitors in the operating room (NIBP, ECG, Pulse oximeter), general anesthesia was induced with intravenous midazolam 0.02mg/kg, propofol 2mg/kg, fentanyl 1.5 microgram/kg; and trachea was intubated with vecuronium 0.1mg/kg. Maintenance was provided by oxygen and nitrous oxide and sevoflurane was the volatile agent used with the circle absorber system.

Intraoperative analgesia was administered in the form of intravenous fentanyl (1.5 microgram/kg) as a bolus at induction followed by 10mcg boluses depending on the variability in heart rate and blood pressure so in order to maintain the vital parameters within 20 % of base line, intraoperatively.

After completion of surgery neuromuscular blockade was reversed with intravenous neostigmine 0.05mg/kg and glycopyrrolate 0.008mg/kg and trachea extubated after return of spontaneous ventilation and consciousness and patients were transferred to the post anesthesia care unit (PACU). Vital parameters like NIBP, SpO_2, and Heart rate were noted perioperatively.

TECHNIQUE

Ultrasound-guided procedure begins with the ultrasound probe being placed on the lateral abdominal wall cephalad to the iliac crest and caudal to the costal margin. The probe is slided anterio – posteriorly and tilted in a cephalo caudal direction until a clear and optimized image of the three lateral abdominal muscles (lateral to rectus abdominis) and the TAP is obtained. [2] Three muscle layers namely external oblique muscle (EO), internal oblique muscle (IO), transversus abdominis muscle (TA) are clearly seen in the image (Figure 1). Changing the depth, gain and frequency and reducing the ambient light, achieves further optimization of the image.[2]

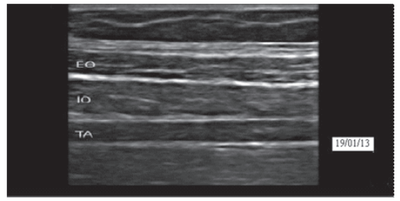

Fig.1 USG image of abdominal wall. EO= External oblique, IO= Internal oblique, TA = Transversus abdominis

Needle is then moved forward from an anteriomedial position in a posterior and lateral direction using an in-plane technique, with the entry point in the skin being separated from the probe in order to improve needle visibility in the long axis[2]. The needle trajectory can proceed in an anterior-posterior direction using an in-plane technique, with the local anaesthetic injection observed in real-time (Figure 2&3).

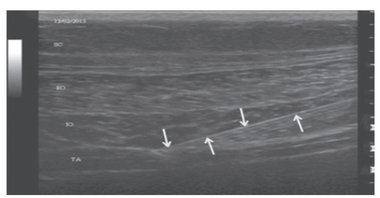

Fig.2 Transverse sonogram of lateral abdominal wall with in-planeimage of needle. SC = Subcutaneous tissue, EO= External oblique muscle, IO = Internal oblique muscle, T = Transversus abdominis muscle, Arrows indicate needle shaft.

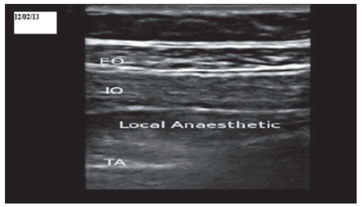

Fig 3. Local anesthetic deposition in transversus abdominis plane. EO= External oblique, IO= Internal oblique, TA = Transversus abdominis

Postoperative pain scores, vital parameters (Blood pressure, Heart rate, Respiratory rate, SpO_2), adverse effects (including lightheadedness, dizziness, vertigo, respiratory depression) (respiratory rate <8 or SpO2 <90%), urinary retention and patient satisfaction scores were recorded at 1 , 2 , 4 , 6 hrs post surgery in the post anesthesia care unit, and then at 12 and 24 hours in the ward. Rescue analgesia was provided with Inj Fentanyl in incremental doses of 0.5 microgram/Kg till NRS score was less than 3. The total fentanyl consumed in the first 24 hours post operatively was recorded in each of the two groups.

STATISTICAL METHODS

Standard tests of significance were applied to find out the p-value. On the basis of our pilot study (with the primary outcome being pain relief at 24 hours), and assuming similar baseline pain scores in both the groups and the postprocedure pain scores at 24 hours with group 1 of 4.05 ± 0.68 , and group2 of 1.60 ± 0.63, with 5% level of significance and power of 90%, we needed to enroll 40 cases in each arm.

RESULTS

Of 92 patients, 80 adult patients, (40 in each group; group 1 with 0.2% ropivacaine and 0.375% ropivacaine) who were scheduled for surgery under general anesthesia requiring TAP Block were enrolled in the study as the rest did not fulfill the criteria for inclusion. The baseline parameters, including age, gender, ASA grade, duration of surgery, were comparable in the two groups (Table 1).

Table 1

PATIENT CHARACTERISTICS	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%) N=40	P value
MEAN AGE (years)	45.25±11.569	40.35±12.579	0.074
FEMALE: MALE	33(82.5%):7(17.5%)	35(87.5%):5(12.5%)	0.531
ASA GRADE I: ASA GRADE II	22(55%):18(45%)	24(60%):16(40%)	0.651
DURATION OF SURGERY (hrs)	1.9125±0.482	1.9063±0.514	0.663

Though, vital parameters did not vary significantly between the groups when postoperative analgesia was supplemented with rescue doses of fentanyl at an NRS>3; but, the difference in NRS between two groups was found to be significantly different at 6 hr, 12 hr, 24 hr ($p< 0.005$). (Table 2-7)

Table 2

PULSE (/min)	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%) N=40	P value
1 Hour	75.95±8.641	74.4±11.033	0.486
2 Hours	74.55±8.114	73.38±9.173	0.546
4 Hours	75.65±9.649	74.62±11.39	0.665
6 Hours	77±9.889	74.68±11.459	0.334
12 Hours	79.05±9.29	76.1±10.884	0.196
24 Hours	80.58±8.7	77.28±10.041	0.12

Table 3

SYSTOLIC BP (mmHg)	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%) N=40	P value
1 Hour	126.88±11.348	127.98±16.395	0.728
2 Hours	126.88±11.743	128.72±18.521	0.595
4 Hours	126.65±10.582	128.88±13.478	0.414
6 Hours	130.52±9.92	129.68±12.137	0.733
12 Hours	131.35±11.407	130±11.547	0.6
24 Hours	134.88±11.581	131.7±12.425	0.241

Table 4

DIASTOLIC BP (mmHg)	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%) N=40	P value
1 Hour	76.92± 6.624	74.02 ± 7.109	0.07
2 Hours	75.62± 5.168	73.5 ± 6.193	0.142
4 Hours	74.25± 7	72.55 ± 3.508	0.089
6 Hours	75.05± 5.203	74.18 ± 3.974	0.401
12 Hours	77.05± 5.888	76.05 ± 4.063	0.379
24 Hours	79.78± 5.807	78.25 ± 4.081	0.178

Table 5

RESPIRATORY RATE	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%) N=40	P value
1 Hour	18.32 ± 0.859	18.2 ± 1.018	0.554
2 Hours	18.48 ± 0.877	18.48 ± 1.086	1
4 Hours	18.78 ± 0.947	18.6 ± 1.105	0.449

6 Hours	18.42 ± 1.13	18.7 ± 1.091	0.271
12 Hours	18.8 ± 1.067	18.78 ± 0.974	0.913
24 Hours	18.88 ± 0.992	18.82 ± 1.107	0.832

Table 6

SpO_2 (%)	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%)	P value
1 Hour	98.42 ± 1.083	98.5 ± 1.086	0.758
2 Hours	98.52 ± 0.905	98.5 ± 0.961	0.905
4 Hours	98.08 ± 1.163	98.18 ± 1.035	0.686
6 Hours	98.25 ± 1.565	98.15 ± 0.949	0.731
12 Hours	98.25 ± 1.428	98.35 ± 0.893	0.708
24 Hours	98.02 ± 1.165	97.95 ± 0.986	0.757

Table 7

POSTOPERATIVE PAIN SCORE (NUMERIC RATING SCALE, NRS)	GROUP I (ROPIVACAINE 0.2%) N=40	GROUP II (ROPIVACAINE 0.375%) N=40	P values
1 hr	0.45 ±0.904	0.22±0.733	0.211
2 hr	0.62±1.03	0.48±0.877	0.547
4 hr	1.3±0.966	0.95±0.959	0.098
6 hr	2.2±0.791	1.72±1.037	0.031
12 hr	3.57±0.781	2.55±1.085	0.001
24 hr	4.2±0.911	3.22±1.000	0.001

Patients in both the groups required fentanyl in their 24 hour postoperative period and though, the interval fentanyl requirements did not vary significantly between the groups at 6 hr and 12 hr; but, the concentration of ropivacaine used impacted the patient satisfaction scores and mean 24 hour opioid consumption postoperatively (Table 8 &9) in a significant manner.

DISCUSSION

Pain management is a fundamental human right.[6] Management of postoperative pain relieves suffering, shorten hospital stay, reduces hospital cost and increase patient satisfaction[7,8,9] Inadequate pain control, causes increased morbidity and mortality.[10,11]

It has been demonstrated that regional anaesthesia techniques using long acting local anaesthetics alleviate and / or prevent acute nociceptive and inflammatory pain, especially when given before surgical stimulus. These techniques are valuable part of multimodal combinations and are known to reduce opioid consumption as well as their related side effects. Use of ultrasound leads to direct visualization of the needle, the anatomy, the neural structures, and the spread of local anaesthetic, and helps in increasing the precision, accuracy and effect of the injectate.

According to the study of O'Donnell[12] and McDonell et al.[1,13], the TAP block analgesia lasts for 36 to 48 hours, which might be due to the slow clearance of local anesthetics in the TAP due to a lesser density of vascularisation in the said plane. El-Dawlatly et al[14] concluded a better pain relief in patients receiving US guided TAP block with 0.5% bupivacaine (15ml on each side of midline) versus the controls alongwith a significantly reduced postoperative morphine consumption in the test group.

In the present study, we compared analgesic effect of two concentrations 0.2% and 0.375% of ropivacaine in two groups of patients (group I and group II respectively) undergoing lower abdominal surgery. The rescue analgesic boluses of fentanyl 0.5 microgram/kg were given according to NRS (>3) and/or the requests of the patients to control the pain. It was observed that higher concentration of Ropivacaine (0.375%) showed a better analgesic effect in terms of NRS at 6, 12, 24 hours, thus providing prolonged analgesia with significantly lesser opoid consumption in group II than group I(P=0.027). The postoperative values of pulse rate, blood pressure and respiratory rate have fluctuated less from their base line in group II as compared to group I which may be due to better pain relief. There was no significant difference in incidence of nausea and vomiting in both groups.

There are many causes of post operative pain in laparoscopic surgeries. The mechanisms suggested for cause of the pain are the secondary visceral pain due to resection, abdominal wall pain due to the abdominal wall extension by the gas injected in the abdominal cavity, and the pain due to the incision at the trocar site[15]. During TAP block, local anesthetic is injected near the T7-T12 intercostal nerve, ilioinguinal nerve, iliohypogastric nerve, and the lateral cutaneous branches of dorsal rami of the L1-L3 at the neurofascial plane between IOM and TAM, in order to block the nerves that dominate the sense of the abdominal cavity.[16,17] McDonell et al. [4] reported a significant sensory blockade between the T7-L1, based on radioactive examination. Tran et al.[2]reported dye spread between T10-L1, based on the cadaver study.

In our study, the range of sensory block would not be precisely assessed because the procedure was performed after induction of general anesthesia, without, any radioactive agent. Hence, a systematic research regarding the range of sensory block and the success of the procedure, depending on the diffusion and spread of local anesthetics, must be performed.

The limitation of the study, which could have influenced rescue analgesia requirement was use of nurse controlled analgesia rather than patient controlled analgesia.

CONCLUSION

We conclude that the group of patients who received 0.375% ropivacaine had lower pain scores in comparison to 0.2% ropivacaine group .They also had decreased requirement for rescue analgesia in addition to better patient satisfaction scores. There was no significant difference in terms of nausea and vomiting between the two groups. No other side effects were observed in any of the groups.

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THYMECTOMY IN A PATIENT WITH MYASTHENIA GRAVIS AND CROHN'S DISEASE-ANAESTHETIC CHALLENGES.

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ABSTRACT

We successfully managed a rare association of Crohn's disease and myasthenia gravis posted for thymectomy. Anaesthesia for this combination can be complicated, drug interactions have to be sought for, side effects of the drugs should be known and adjustments for the same should be made when considering the anaesthetic plan.

KEY WORDS: Myasthenia gravis (MG), Crohn's disease (CD), ulcerative colitis (UC), Inflammatory bowel disease (IBD).

INTRODUCTION

Crohn's disease causes a chronic, nonspecific, transmural inflammation of the intestine may be seen throughout the gastrointestinal tract, from the oropharynx to the anus. Crohn's disease also manifests itself in many extraintestinal symptoms of eyes, skin, and joints.[1] Association with myasthenia gravis though rare and has not been reported earlier. The combination of Myasthenia gravis and Crohn's disease have many challenges in the perioperative period for anaesthesiologist.

CASE REPORT

A sixty-two year male weighing 50 Kg (BMI 25.5 kg/m^2) with a diagnosis of myasthenia gravis and Crohn's disease was posted for transsternal thymectomy. On reviewing the history, he was diagnosed with Crohn's disease five years back and was presently on oral prednisolone (10 mg) once a alternate day and oral mesalazine (500 mg) thrice a day. He had intermittent exacerbations and was managed with steroid and immunosuppressant. Presently the disease was under remission with ongoing steroid and mesalazine. Two months back, he was diagnosed to have myasthenia gravis and corresponded to Ossermans classification grade II, i.e, mild generalised weakness associated with ocular symptoms (diplopia). The myasthenic symptoms were optimised with oral pyridostigmine (60 mg) thrice a day and azathioprine (50 mg) once a day.

Presently on examination, patient had mild dyspnoea in supine rather than left or right lateral position. His pulse rate was 60/minute and regular. The blood pressure134/84 mmHg. On auscultation, chest was bilaterally clear with air entry more towards the right than left. Mouth opening was three fingers and modified Mallampati grade of II, short neck, and submental fat was present. Breath holding time was more than 35 seconds. Ptosis of right eye was present. Preoperative investigations were haemoglobin 13 gm/dL, WBC 9500/mm^3, Platelets 2.13lacs/mm^3,

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random blood sugar 81mg/dL, Blood urea 34mg/dL, Serum creatinine 1.15mg/dL. Serum sodium 141meq/L, S. potassium 3.7meq/L. Thyroid function tests were within normal limits. Pulmonary function tests revealed mild restriction with a FVC of 70%, FEV1 of 62% and FEV1/FVC of 94% of predicted values. Chest X-ray revealed mediastinal widening and marked tracheal deviation to right. Elelctrocardiogram (ECG) indicated sinus bradycardia (herat rate of 56/min). Ejection fraction was 60% on echocardiography. MRI of chest revealed a well defined lobulated heterogenous soft tissue density mass 7.3 x 7.5 cm in anterior mediastinum extending posteriorly and superiorly with multiple specs of calcification noted within it. Mass was displacing trachea to right and extending to neck on the left side. The large solid mass in anterior mediastinum with infiltration was displacing branches of aorta upto sternum and upper dorsal vertebrae, trachea is pushed to right though normal in calibre. Left brachiocephalic vein was compressed. Multiple lymph nodes were seen in periphery of mass of which few are adherent. AchR Ab were positive13.46 nmol/l(>0.4nmol/L - positive). On bronchoscopy, trachea was deviated to right and bilateral vocal cords were normal.

Informed written consent for surgery and anaesthesia including epidural and central line were taken. Patient was kept nil per oral for 6 hours. Premedication included oral ranitidine (150 mg) and oral alprazolam (0.25 mg) in the night before surgery. Morning dose of pyridostigmine was given with sips of water. In the operating room, routine monitors (5 lead electrocardiogram, noninvasive blood pressure, pulse oximeter) were attached and 18 G intravenous access was gained in left forearm. Intravenous hydrocortisone 100mg was administered. Epidural catheter was placed in T10-11interspinous space in left lateral position. Patient was turned to right lateral position. Anaesthesia was induced with intravenous fentanyl (100 µg) and propofol (100 mg) in incremental doses. Mask ventilation was ensured with sevoflurane in 100% oxygen. Laryngoscopy with glidescope revealed a Cormack Lehane Grade IIa and 7.5 mm ID cuffed flexometallic tube with stylet was passed and secured at 21cm mark. Injection atracurium 30mg was given intravenously. Anaesthesia was maintained with oxygen air mixture, sevoflurane (0.5-0.8 MAC) and propofol infusion. Epidural space was loaded with 10 ml of 0.125 % bupivacaine with 25µg fentanyl. After sternotomy, thymus was removed and surgical duration was around 4 hours. The pyridostigmine was given through ryles tube. Patient was shifted to ICU for further management where he was extubated after 2 hours when respiratory efforts were adequate. Postoperative course was uneventful and patient was discharged on 10th postoperative day. Postoperative steroid, pyridostigmine and mesalizine were continued.

DISCUSSION

Myasthenia gravis is associated with other autoimmune disorders like rheumatoid arthritis, sjogrens syndrome, systemic lupus erythematosis, diabetes mellitus, hypothyroidism and thyrotoxicosis commonly.[2-4] Association between myasthenia gravis and Crohn's diseaseis rare. There are only 3 case reports till date describing the coincidence of the two diseases.

Myasthenia gravis has been reported to be associated with both ulcerative colitis (UC) and Crohn's disease (CD).[5-8] Autoimmune disorders, including MG, occur more frequently in UC than in CD. Autoimmune dysregulation is the central defect in both MG and these inflammatory bowel disease (IBD). Both IBD and MG may be associated with an elevated carcinoembryonic antigen (CEA) and decreased peripheral lymphocyte counts that subsequently normalise following thymectomy.[9]The immunological link between MG and IBD is highlighted by two reports of patients undergoing surgical treatment. One report of a patient with both MG and CD documented improvement in perineal and perianal disease following thymectomy for severe uncontrolled MG.[7] Another patient with both MG and UC demonstrated regression of the myasthenia following proctolectomy.[10]

Anaesthesia was managed as standard for thymic mass with myasthenia gravis by avoiding neuromuscular blocking agents prior to intubation, intubating in lateral position, using minimal doses of neuromuscular blockers, epidural analgesia to decrease the dose of inhalational agents, avoiding drugs that precipitate myasthenia, continuation of pyridostigmine and planned late extubation.

Drugs used for Crohn's disease like mesalazine can have interactions with azathioprine and can increase the effective dose of azathioprine and chances of toxicity of which low blood count and liver toxicity are most worrisome.[11] Monitoring renal functions in patients on mesalazine helps monitoring its side effect on kidneys, and NSAIDS should be avoided.[12] Mesalazine associated lung disease is a known entity including bronchiolitis obliterans, bronchiolitis obliterans with organising pneumonia (BOOP), and interstitial pneumonitis with the most common being eosinophilic pneumonitis.[13] Mesalazine associated folic acid deficiency can cause anaemia. Given the gastrointestinal side effects and the possibility of aggravating mucosal inflammation, non-steroidal antiinflammatory drugs (NSAID) should be avoided in IBD.[14]

CONCLUSION

Myasthenia gravis associated with Crohn's diseaseis a rare entity. Thymectomy has been reported to improve symptoms of Crohn's disease and should be done on priority basis for such patients.

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BRACHIAL PLEXUS INJURY FOLLOWING ARM ABDUCTION AT 90˚ IN SUPINE POSITION: AN UNUSUAL CASE REPORT

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ABSTRACT

Perioperative peripheral nerve injury is one of the leading causes of postoperative morbidity and professional liablity. Of the peripheral nerve injuries, ulnar neuropathy is the most common (28%) followed by brachial plexus injury (20%). It has been known that injury to the brachial plexus occurs when the arm is kept abducted to greater than 90˚ during surgery. American Society of Anaesthesiologists (ASA) guidelines also recommend that upper limit of arm abduction should be 90˚. We discuss a case of brachial plexus injury in a patient even when the arm was kept abducted at 90˚ for the entire duration of surgery.

KEYWORDS: Brachial plexus, peripheral nerve injury, arm abduction, neuropraxia.

INTRODUCTION

Perioperative peripheral neuropathy has long been a major cause of concern for anaesthesiologists. These injuries not only contribute to significant postoperative morbidity, but they are also a source of liability for anaesthesiologists. Of the peripheral nerve injuries, ulnar neuropathy is the most common (28%) followed by brachial plexus (20%)[1]. Brachial plexus injury commonly occur due to abduction of upper limb for more than 90˚ in the perioperative period owing to the stretching of the plexus[2]. However in our case, brachial plexus injury occurred at an arm abduction of 90˚. To the best of our knowledge there is no report of brachial plexus injury occurring at this position.

CASE

A 40-year-old male with carcinoma urinary bladder, who had no metabolic or neurologic disease was scheduled for radical cystectomy with hartmann's pouch orthotopic neobladder on elective basis. The procedure was done under combined general and epidural anesthesia. After induction of anesthesia, right subclavian vein was catheterised using a triple lumen central venous catheter in first attempt. The duration of the surgical procedure was 10 hours and 30 minutes. The patient was in lithotomy position for the first 30 minutes followed by supine position with both arms abducted to 90˚ and neutral forearm position for the next 10 hours. Intra-operative parameters were normal. The patient was extubated on the operating table at the end of the surgical procedure and shifted to recovery room. On the post-operative day (POD) 1, patient complained of inability to move the right upper limb with no associated pain or numbness. Ultrasonographic examination of the brachial plexus was within normal limits. Neurological examination of the patient revealed lower motor neuron type of

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weakness with preserved biceps reflex in the right upper limb. The tone was reduced with a power of 2/5 in shoulder and elbow, and wrist power of 1 to 2/5. Small muscles of the hand were weak with the extensors weaker than flexors. Triceps and brachioradialis reflexes were lost with preserved biceps reflex. The sensation was normal to pinprick. Limb physiotherapy was started immediately and the weakness improved over a week period. On POD 6, the upper limb power was 5/5 with the patient still complaining of paraesthesia in the ulnar distribution which improved in another 3 days. The nerve conduction study done on POD 10 revealed normal conduction study in bilateral median, ulnar, radial, axillary and musculocutaneus nerves.

DISCUSSION

Anesthesia related nerve injuries remain the second important cause of malpractice claims next to death and brain damage[3]. Also, the incidence of these nerve injuries remain the same over many years. This calls into question our understanding of the mechanism of nerve injuries and the preventive strategies recommended to prevent them. Even though most of the injuries occur either due to direct trauma or improper positioning and padding in the operating table (resulting in stretching, compression or even avulsion of the nerves), some have occurred even in the presence of appropriate positioning and padding. Thus even the best of the positioning and padding strategies may not guarantee the prevention of nerve injuries during anaesthesia.

The ASA practice advisory for the prevention of perioperative peripheral neuropathies updated in 2011 recommends specific positioning strategies for the prevention of peripheral nerve injuries[4]. For the prevention of brachial plexus neuropathy, they recommend that the upper limit of arm abduction should be 90˚. This is based on the review of literature of 17 articles which reported brachial plexus injuries. The task force considered two of the reports of brachial plexus injuries occurred due to arm abduction at 90˚. But the detailed review of these two reports showed that the causes implicated for both the nerve injuries were different. In one report, the authors Ellul and colleagues[5] believed that the towel support kept behind the shoulder could have exerted too much pressure resulting in the injury. In the other report, Tomlinson and colleagues[6] believed that the plexus injuries occurred due to sternal retraction during median sternotomy. These authors believed that the hands-up position during median sternotomy could result in decreased incidence of brachial plexus injuries.

In our case, the surgery lasted for more than 10 hours duration and both the arms were abducted at 90˚ for the entire duration of the procedure. The occurrence of symptoms of brachial plexus injury in the immediate postoperative period with the complete resolution of symptoms in a week period suggest that the mechanism involved is neuropraxia. Neuropraxia could have occurred because of the stretching of plexus at 90˚ arm abduction. Also prolonged duration of the surgery with the arms in the same position for the entire duration of the surgery seems an important factor that could have added to the insult. Even though perioperative peripheral neuropathies have been documented in the literature for more than a century, very little is known about the relationship between duration of the particular position and the occurrence of nerve injury. Recently Somatosensory Evoked Potentials (SSEP) are being evaluated as a means of monitoring for nerve injuries during intraoperative period[7-9], and may prove a valuable tool for prevention of perioperative peripheral neuropathies.

In conclusion, our case emphasizes the need for careful preoperative assessment, meticulous positioning and padding during anesthesia and avoidance of certain arm positions for prolonged duration. Also monitoring for nerve injuries during intra-operative period in selected patients may decrease the incidence of peripheral neuropathies. Lastly, early diagnosis of nerve injuries and immediate institution of physiotherapy is key for prevention of permanent nerve damage.

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BOJACKSON REES CIRCUIT : A USEFUL AID IN DIFFERENTIAL VENTILATION

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ABSTRACT

We would like to highlight case of Differential lung ventilation in blunt chest trauma case where Double lumen failed to achieve appropriate ventilation, despite a DLT there was soiling of the healthy lung with blood and hence the patient was unable to maintain oxygen saturation but with the availability of two circuits, including JR circuit, and two sources for oxygen, the better lung could be entirely isolated in its true sense and thereby helped in maintaining lung functions during the surgery. Thus old equipment was used with a novel approach which helped to resuscitate this patient.

INTRODUCTION

Differential lung ventilation is a method for isolation of lungs, which is frequently required during thoracic surgeries. Double lumen tube (DLT) is an ideal method for lung separation; however it may sometimes fail to maintain saturation. Herein we report a case of chest injury where despite a DLT there was soiling of the healthy lung with blood and hence the patient was unable to maintain oxygen saturation[1].

CASE REPORT

A 25yr old male patient presented to our casuality with thoracic injury following road side accident. There were no other associated injuries and no other significant medical or surgical history. He was planned for emergency thoracotomy. In the preoperative examination the patient was conscious and oriented to place time and person and normothermic. Vitals were maintained with pulse of 120/min blood pressure of 86/70 mm Hg and respiratory rate of 30/min. On examination of respiratory system there were bruises on chest wall present (more on right side) ICD in situ on right side with column movement present. Blood was visible in column. On auscultation air entry was found to be decreased and added sounds were present on the right side, left side appeared to be normal. All other systemic examinations were within normal limits. No investigations were available.

Patient was taken up for emergency thoracotomy and ECG, NIBP, SpO_2 monitors were attached. IV access was achieved with 18G and 16G cannula and ringer lactate and HAES drip were started. Premedication was given with Inj Ranitidine 150mg, Inj Perinorm 10mg, Inj glycopyrolate 0.2mg. Preoxygenation was done for 5 mins with 100% oxygen with Baine's circuit, Induction done with Inj Fentanyl 100mcg Inj Ketamine 100mg given. After checking for adequacy of mask ventilation, inj Atracurium 25mg given. A 39 size left sided DLT was placed and placement confirmed by auscultation and on $eTCO_2$ graph. Intraoperatively the patient was put in left lateral position and right sided thoracotomy was started. Right limb of the DLT was clamped as right sided thoracic cavity opened and One Lung Ventilation (OLV) started. Massive haematoma was found in the thoracic cavity. However all parameters were maintained. After 15 mins, SpO_2 started falling upto 90%. On inflation of the right lung, blood form the right limb of the DLT reached the Y- Piece and soiled the entire circuit. Fearing the contamination of the better left lung by blood and hence compromising the respiration was a challenge. The Y-Piece was removed and the left limb of DLT was directly connected to the machine and the right limb was ventilated by a Jackson-Rees (JR) circuit using an extra oxygen source.

Thereafter SpO_2 was maintained and the surgery proceeded as planned. Rest of the intraoperative course was uneventful.

At the end of the surgery, after proper suctioning of oropharyngeal cavity, residual neuromuscular block was reversed using inj. Glycopyrrolate 0.4 mg and Inj. Neostigmine 2.5mg. Patient was extubated as per routine Post operative Patient was comfortable after adequate pain relief.

DISCUSSION

The lethality of isolated chest traumas is about 5% to 8%. Up to 25% of all deaths caused by trauma are related to chest injuries,[1] and mortality dramatically increases as a function of increased chest trauma force.[2] Polytrauma and chest trauma often result in significant hypoxemia secondary to direct or indirect lung injury. Indirect lung injury can result from the systemic inflammatory response to the trauma itself or due to the interventions such as large volume fluid resuscitation and blood product transfusion[3]. However, direct injury to the parenchyma often leads to bleeding, contusion and impaction of secretions with subsequent airway obstruction. The consequence is the development of multiple areas of atelectasis.

Maintenance of respiratory physiology can prove challenging. Various lung isolation techniques including, double lumen tube, bronchial blockers and endobronchial intubation, help overcome these challenges in an effective and practical manner[4]; However each case mandates individualized method of care with due regard to availability of equipments in a given set up. In this case despite availability of a DLT, the massive right sided haemothorax posed a grave danger to the healthy left lung which could've proved fatal. But due to the availability of two circuits, including JR circuit, and two sources for oxygen, the better lung could be entirely isolated in its true sense and thereby helped in maintaining lung functions during the surgery. Thus old equipment was used with a novel approach which helped to resuscitate this patient.

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Asian Archives of Anaesthesiology and Resuscitation (AAAR) was started in 1971 by initiative of late Prof. W.E. Spoeral of University of Western Ontario, London. He visited JIPMER, Pondicherry in 1970-71 and helped in starting this journal .Since then, AAAR was published under able guidance of (late) Prof. N.P. Singh continuously till date.

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AAAR publishes original articles, review articles, special, articles, medical intelligence articles, case reports, technical communications editorials, book reviews and letters to the editor.All papers, after editorial scrutiny are peer reviewed by at least two referees. Acceptance is based on significance, originality and validity of the material presented.

SUMMARY OF REQUIREMENTS

Type the manuscript double spaced, including title page, summary (abstract) and key words, text, acknowledgements, references, tables (each table complete with title and foot notes on a separate page) and legends for illustrations. Each of the above mentioned component of the manuscript should begin with a new page, maintaining the sequence. Illustrations must be of good quality, usually 1227 x 173 mm (5 x 7 in) but not larger than203 x 254 mm (8 x 10 in). Manuscript should be submitted articles may kindly be sent only on such requests. Authors should keep out the manuscript on white bond paper preferably ISO A4 size with margins of at least 25 mm(1 in). Type or print on only one side of the paper using double spacing throughout. Number the pages consecutively in the upper right hand corner of each page beginning with the title page.

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The article is expected to be written in simple and small sentences. Due care need to be exercised by all the authors towards spelling, grammar and style of writing. The article needs to be written in 'past-participle passive voice' format.

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The title page should carry:
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All persons designated as authors should qualify for authorship. The order of authorship should be a joint decision of the co-authors. Each author should have participated sufficiently in the work to take public responsibility for the content. Authorship credit should be based only on substantial contributions to
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Any part of an article critical to its main conclusions must be the responsibility of at least one author.
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The second page should carry the summary (abstract) preferably of not more than 350 words,

summarizing the work systematically by disclosing context, objectives, design, setting, participants, interventions, main outcome measures, results and conclusions .The abstract should reflect the paper and describe the message succinctly and accurately. The format of the abstract may be based on the standard IMRAD structure (Introduction, Methods, Results And Discussion) of the paper below the summary, provide and identify as such, 3 to 5 key words that will assist indexers in cross indexing. Use terms from the medical subject headings (MeSH) list of Medline.

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The text of observational and experimental articles is usually but not necessarily divided into sections with headings viz., Introduction, Methods, Results and Discussion (IMRAD). Other types of articles such as case reports, reviews, editorials are likely to need other formats. Nevertheless, a fundamental structure is the basis of all scientific papers.

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Start on a new page stating clearly the question being answered in the study. To lead the reader to this point it is essential to review the relevant literature briefly. Do not include data or conclusions from the work being reported.

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Over all the Material and Methods should answer three fundamental questions viz:How the study was designed? How the study was carried out? How the data were analysed? Though brevity is desirable, describe the selection of the observational or experimental subjects (patients of laboratory animals, including controls) clearly justify/ explain the sample size. Identify the methods, apparatus (manufacturer's name and address in parenthesis) and procedures in sufficient detail to enable other workers to reproduce the results. Give references to established methods, including statistical methods; provide references and brief descriptions for methods that have been published but are not well-known; describe new or substantially modified methods, give reasons for using them and evaluate their limitations. Identify precisely all drugs or chemicals used, including generic name(s), dose(s), and route(s) of administration.

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Authors should avoid the use of names, initials and hospital numbers which might lead to recognition of a patient. A patient must not be recognizable in photographs unless written consent of the subject has been obtained. A table or illustration that has been published elsewhere should be accompanied by a statement that permission for reproduction has been obtained from the publishers.

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Input from a statistician should be sought at the planning stage of the study. The statistical methods with enough details to enable a knowledgeable reader with access to the original data to verify the reported results, should be incorporated. Give a brief note of how you arrived at the chosen sample size of your study. Give the exact tests used to analyse the data statistically and include an appropriate reference if the test is not well known. If computer software was used, give the type and version of the software. When possible, quantify findings and present them with appropriate indicators or easurement error or uncertainty (such as 95% Confidence Intervals). Avoid sole reliance on statistical hypothesis testing such as the use of p values, which fails to convey important quantitative information.

Results

This section has to have two essential features: there should be an overall description of the major findings of the study; and the data should be presented clearly and concisely. Present your results in logical sequence in the text, tables and illustrations. Do not repeat in the text all the data in the table or illustrations; emphasise or summarise only important observations. It is worthwhile stating briefly what you did not find, as this may stop other workers in the area undertaking unnecessary studies.

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It is difficult not to write a long and detailed analysis of the literature that you know so well. A rough guide to the length of 'Discussion', however is that it should not be more than one third of the total length of the manuscript (IMRAD) Emphasise and summarise the new and important findings of the study and the inferences that follow from them. Discuss possible problems with the methods used. Compare your results with previous work or relate your observations to other relevant studies. Discuss the scientific and clinical implications of your findings. Do not repeat in detail data or other material given in the 'introduction' or the 'Results' section. Discuss and analyse the limitations of your study, including suggestion for future work.

Conclusions

Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not completely supported by your data.

Acknowledgements

They should be brief and should include reference to the source of technical help, material support and financial assistance. Individuals named must approve their inclusion in the acknowledgements, before the paper is submitted.

References

The references of the article are the foundation on which the work of the study is built. They provide the scientific background that justifies your study, including the methods used. AAAR follows 'Vancouver style' of quoting the references as superscripts in which references are numbered consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals in parentheses. References cited only in tables or in legends to figure should be numbered in accordance with a sequence established by the first identification in the text of the particular table or figure. Use the style of the examples below, which are based with slight modifications on the formats used by the U S National Library of Medicine in Medline database. The titles of journals should be abbreviated according to the style used in Medline. The references must be verified by the authors(s) against the original documents. Restrict references to those that have a direct bearing on the work described, preferably less than 25 for general articles and 6 for short communications.
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1. Standard journal article List all authors, but if number exceeds six, list only first three and add et al. Fery AM, Haynes AR, Owen KJ, Farrall M, Jack LA, Lai LY, et al. Predisposing locus for Alzheimer's disease on chromosome 21, Lancet 1989; 1: 352-5.

2. Organisation as author : The Royal Marsden Hospital Bonemarrow Transplantation Team. Failure of syngeneic bonemarrow graft without preconditioning in post- hepatitis marrow aplasia. Lancet 1977; 2: 742 4.

3. No author given : Coffee drinking and cancer of the pancreas (editorial). BMJ 1981; 283:628.

B. Books and other Monographs

1. Personal author(s): Colson JH, Armour WJ. Sports injuries and their treatment, 2nd rev. ed. London: S. Paul, 1986.

2. Editor(s), compiler as authors : Diener HC, Wilkinson M, editors. Drug-induced headache. New York: Springer Verlag, 1988.

3. Chapters in a book: Weinstein L, Swartz MN. Pathologic properties of invading microorganisms. In:Sodeman WA Jr, Sodeman WA, editors. Pathologic physiology: mechanisms of disease. Philadelphia: Saunders, 1974: 457-72.

C. Other published Material

Newspaper article: Rensberger B, Specter B, CFCs may be destroyed by natural process. The Washington Post 1989 Aug. 7; Sect. A:2 (Col.5).

D. Unpublished Material

Lillywhite HD, Donald JA. Pulmonary blood flow regulation in an aquatic snake. Science. In press or Personal Communication

E. Internet References

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Use only standard abbreviations. Avoid abbreviations in the title and abstract. The full term for which an abbreviation stands, for should precede its first use in the text unless it is a standard unit of measurement.

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A Completed checklist must accompany each manuscript submitted to Asian Archives of Anaesthesiology and Resuscitation.

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General

1. Two complete sets of the manuscripts (including tables) are submitted.

2. A floppy disk or CD is submitted with two files : the complete manuscript and a separate file containing only the title page, abstract, and references.

3. Manuscript is typed double-spaced, with ample, left ,justified, margins.

4. Pages are numbered consecutively, starting with the title page.

Title Page

1. On the first page are typed the title, author name(s) and major degree(s), and affiliation(s).

2. The name, address, telephone and FAX numbers, and E-mail address of the corresponding author are to be given.

3. The manuscript title is no longer than 100 characters (letters and spaces) and does not contain any abbreviations.

4. A short title (no more than 30 characters) is provided at the bottom of the page for use as a running foot.

Summary

* An abstract is provided. For all kind of articles, this abstract is limited to 200-250 words.

References

1. References correspond to the specifications of the Uniform Requirements for Manuscripts Submitted to Biomedical Journals" promulgated by the International Committee of Medical Journal Editors.

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3. Each reference is cited in the text. Those appearing in tables and figures should be cited in the text where the table or figure is mentioned.

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Tables

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3. Each table contains all necessary information in order that it may stand alone, independent of the text.

4. No table contains data that could be included in the text in several sentences.

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2. Figures have been prepared with the journal column size in mind.

3. Letters and identifying marks are clear and sharp, and the critical areas of radiographs and photomicrographs are identified.

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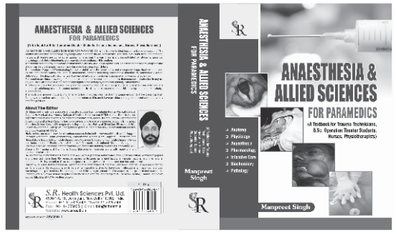
5. Legends are typed together on one page. Legends for photomicrographs include information regarding stain and magnification.



BOOK REVIEW

ANAESTHESIA AND ALLIED SCIENCES FOR PARAMEDICS,2013,first edition

Editor-Dr Manpreet Singh, MD, FCCP, FIMSA, FACEE,MAMS

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The editor of this book, Dr Manpreet Singh is involved in teaching the students of BSc Medical Technology and Operation Theatre, Trauma Technician courses, MBBS and MD (Anaesthesiology and Intensive care) at Government Medical College, Chandigarh ,India.

'ANAESTHESIA AND ALLIED SCIENCES FOR PARAMEDICS' is first book of its kind and comprises of six sections. All sections are colour coded for easy identification.

Section one consists of anatomy, physiology and clinical biochemistry for paramedics. Details of all muscles, bones and joints along with their actions, nerves and vessels are compiled in a tabular form so that it can be easily learnt and recapitulated by students. Essential physiology and clinical biochemistry are concised subsections of this section.

Second section provides every detail about anaesthesia and its various sub-specialities. This section has 40 chapters i.e from history of anaesthesia till modular operation theatre suit details. Apart from basics of anaesthesia and sub-specialities of anaesthesia, it highlights operation theatre suit, air-conditioning of Operation theatre and ICU, sterilization, pain management, dialysis room management and transportation of patients and anaesthesiologists.

Third section, 'Pharmacology in Anaesthesia' describes intricacies of all anaesthetic drugs and emergency drugs. These drugs are described in tabular forms in easy language. This section will help the students to explain the drugs that are asked in table viva during examination.

Section four covers all the anaesthesia instruments. These includes anaesthesia machine , automated external defibrillator, sutures, vaporizers and all airway management equipments. The details of instruments will be very beneficial for the students during training periods, examination, table viva and day-to-day practice.

Fifth section provides knowledge of 32 unique topics of modern anaesthetic practices that requires utmost attention. It highlights brief knowledge about clinical audit, hospital waste management, ECG, EMG, cardiopulmonary resuscitation 2010 guidelines, intensive care topics and physics in anaesthesia.

The final section 6, highlights all the scoring systems, algorithms and grading in anaesthesia. The students will be elated to read this section as they will feel comfortable to find all gradings at one place.

This book will be extremely useful to all residents of anaesthesiology and paramedics i.e MSc. Operation Theatre, BSc Medical Technology students, operation theatre technicians nurses, physiotherapists and trauma technicians. I assure that the student will not move away from this comprehensive book that will be useful in all types of examinations, skill development and knowledge augmentation.

The book is a sincere tribute to my father who had this dream for me. I am fortunate enough to have blessings from Almighty, my teachers and parents. All the contributors of this book have provided me a great support and deserve my heartfelt gratitude.

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