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# Serratus Plane Block as primary analgesic technique for Off-Midline Upper Abdominal Surgeries: A Case series Of Open Nephrectomies.

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## Introduction

Upper abdominal surgery is associated with a significant degree of acute pain which requires multimodal analgesia for postoperative pain control. Serratus plane block (SPB), originally described by Blanco, primarily used as an analgesic modality for major breast surgeries[1], was subsequently used in thoracotomies[2] and rib fractures[2] with good outcome. To our knowledge, there is no literature describing SPB for any abdominal surgery. We would like to report the use of SPB as an analgesic modality in 5 patients undergoing nephrectomy.

| Case | Background | Surgery & Indication | SPB | Analgesia |
|---|---|---|---|---|
| 1 | 48-year-old lady, ASA II, BMI 28.3 kg/m$^2$ | Left open nephrectomy for left emphysematous pyelonephritis | Catheter technique: Bolus 30ml 0.375% ropivacaine. Catheter infusion 0.2% ropivacaine was running at 8-12ml/hour | Intraoperative: iv morphine 3mg; postoperative: oral paracetamol 6hourly, oral tramadol 50mg 8hourly. |
| 2 | 59-year-old man, ASA II, BMI 24.5 kg/m$^2$ | Right open nephrectomy for right renal cell carcinoma | Catheter technique: Bolus 30ml 0.375% ropivacaine. Catheter infusion 0.2% ropivacaine was running at 10-15ml/hour | Intraoperative: iv morphine 6mg; postoperative: IV paracetamol 1g 8hourly, switch to oral on POD2, oral tramadol 50mg 8hourly |
| 3 | 75-year-old lady, ASA II, BMI 20.5 kg/m$^2$ | Left open nephrectomy for left pyelonephritis with nephrolithiasis | Catheter technique: Bolus 40ml 0.375% ropivacaine. Catheter infusion 0.2% ropivacaine was running at 8ml/hour which reduced to 5ml/hour by POD2 | Intraoperative: iv morphine 6mg; postoperative: oral paracetamol 1g 6hourly, oral tramadol 50mg 8hourly |
| 4 | 69-year-old lady, ASA II, BMI 18.3 kg/m$^2$ | Left open nephrectomy for left renal cell carcinoma | Catheter technique: Bolus 30ml 0.375% ropivacaine. Catheter infusion 0.2% ropivacaine was running at 7-9ml/hour | Intraoperative: iv morphine 6mg; postoperative: oral paracetamol 1g 6hourly, oral tramadol 50mg 8hourly |
| 5 | 62-year-old man, ASA II, BMI 22.8kg/m$^2$ | Right open nephrectomy for right renal cell carcinoma | Catheter technique: 30ml 0.375% ropivacaine. Catheter infusion 0.2% ropivacaine was running at 8ml/hour | Intraoperative: iv morphine 6mg; postoperative: oral paracetamol 1g 6hourly, oral tramadol 50mg 8hourly. PCAM: total 24hour postoperative morphine usage 5.5mg |

## Case Report

All patients gave informed consent for publication. Subjects received standard anaesthetic care for open nephrectomy. After induction of general anaesthesia, patients were placed in lateral position and all blocks were performed under sterile fashion.

Serratus plane blocks (SPB), were performed using Sonosite M-Turbo (Bothell, WA, USA) ultrasound guidance with high frequency 13-6MHz 35mm linear transducer using the technique described by Blanco with modifications in terms of transducer orientation, level of block and location of needle entry (modified approach, Figure 1).


Figure 1
(left): Probe orientation and needle insertion point for modified SPB.
(Below): Ultrasound image of serratus anterior muscle in relation to surrounding structures.

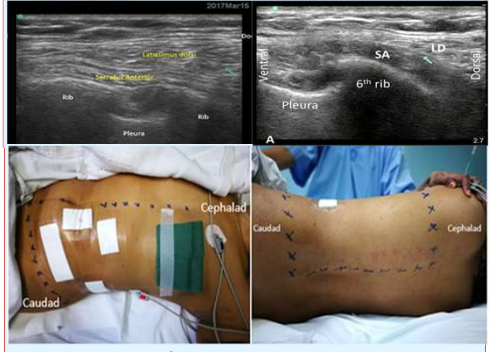


Figure 2 : Area of sensory loss by cold sensation from T6 to T12 level

Contrary to Blanco, we performed this block at the level of 6th rib and below (by rib counting) and an anatomical reference point – xiphisternum level which correlates with 6th intercostal space. A Tuohy 18G 100mm Contiplex needle (B. Braun, Melsungen, Germany) was introduced in-plane. Local anesthetic volume of 30-40ml 0.375% ropivacaine was deposited above serratus anterior plane following which, a 20G indwelling catheter was inserted for infusion of 0.2% ropivacaine. All patients were reviewed twice daily by Acute Pain Service (APS) team and had resting and dynamic pain scores evaluated using visual analogue scale (VAS). Area of reduced sensation to cold was mapped at postoperative day (POD) 1 (Figure 2). Follow up reviews were discontinued once intravenous patient-controlled analgesia morphine (PCAM) or perineural catheter was not required with established adequacy of analgesic control using enteral analgesics.

All patients achieved VAS scores of less than 4 (rest and movement) up to 96 hours. Analgesia was achieved with supplemental oral Paracetamol 1g QID and Tramadol 50mg TDS once allowed orally.

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## Discussions

The anterior abdominal wall is innervated by branches from thoraco-abdominal intercostal nerves which originate from T6-T12 spinal nerves. Lateral branches, which emerge through serratus anterior muscle plane before dividing into their anterior and posterior cutaneous branches respectively. A modified serratus plane block (mSPB), potentially will block the lateral cutaneous branches as they pass through these planes, providing denervation from the edge of rectus abdominis anteriorly to the erector spinae posteriorly. Understanding the necessity to block lower thoracic branches for abdominal surgeries, our approach requires aligning position of the transducer to a slightly more caudal orientation with extra emphasis on denervation of the posterior divisions of the lateral cutaneous branches.

In conclusion, mSPB may have a role in providing analgesia for open nephrectomy. However, the correct locale that provides optimal dermatomal denervation for block require further evaluation via imaging or cadaveric dissection studies.

## References

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