

Evaluation of efficacy of combined ultrasound assisted adductor canal and IPACK block for postoperative analgesia in patients undergoing knee surgeries

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Abstract: Postoperative analgesia is an essential part of the perioperative care of any surgical patient. Knee injuries and arthroscopy assisted ligament repairs are getting more common nowadays. Systemic opioids are the mainstay of postoperative analgesia but with side effects. Complete deafferentation is also not possible with drugs. In a case series of five patients, we administered spinal anaesthesia followed by a single shot combination of adductor canal block and IPACK block (interfascial plane between popliteal artery and capsule knee) to get early postoperative analgesia. There were no side effects. These results may open out further research in such combined blocks after knee surgery.

Key words: Postoperative pain, knee, nerve blocks

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I. Introduction:

The effective relief of postoperative pain is of utmost importance to anyone treating patients after surgery. Postoperative analgesia has significant physiological benefits; hence, adequate monitoring of pain relief is becoming an important postoperative quality measure in health care¹. The goal of postoperative pain management is to reduce or completely eliminate pain and discomfort with fewerside effects. Various agents (opioid vs. nonopioid), or various routes (oral, intravenous, dermal, neuraxial, regional) and different modes (patient controlled vs. “PRN”) for the treatment of postoperative pain exist. Although usually the mainstay of is opioid based, increasingly more evidence exists to support a multimodal approach with patient specific concerns to reduce opioid side effects and improve pain scores². Pain in the immediate post-operative period after knee ligament repairs may hinder rehabilitative programmes and also cause various pathophysiological consequences. Regional anaesthesia with nerve blocks has become a mainstay in postoperative analgesia. Hence we planned a study of worthiness of combined nerve blocks in patients undergoing knee surgeries.

II. Methodology:

Five patients of ASA 1 or 2 coming for unilateral anterior cruciate ligament (ACL) repair were planned to have a combined blocks after surgery. All the five patients were in the age group of 25 – 55 with a history of knee injury a few months to a year ago with clinical features of ACL injury. They were posted for arthroscopy assisted ACL repair. The four patients were ASA 1 and the only one patient was a controlled diabetic on oral hypoglycaemic drugs. They were having normal routine investigations. All patients were explained about VAS scores of pain prior to surgery and the type of intervention to be done. They were made fit and shifted to operation theatre. After attaching monitors, which included ECG, pulse oximetry and non-invasive blood pressure, intravenous ringer lactate was administered to about 500 ml. Then, all were positioned at lateral position with surgical side dependent to enhance the efficiency of block. They were administered 2.5 ml of hyperbaric 0.5 % bupivacaine to achieve a level of T10. They were positioned and after tourniquet, surgery started. At the end of the surgery, all patients were administered combined adductor canal block and interfascial plane between popliteal artery and capsule knee (IPACK). All the blocks were done using Sonosite X porte ultrasound machine. After proper sterile precautions, a high frequency linear probe was used to identify the adductor canal and the saphenous nerve. Ten ml of 0.25% bupivacaine was deposited around the nerve. The ultrasound was further used to identify the spread of the local anaesthetic solution. In the same supine position with legs flexed at the knee, popliteal artery was identified and the thick white line below the artery which is the capsule of the knee was identified. In between the identified structures, 20 ml of 0.25% bupivacaine was spread

in the plane to complete IPACK block(figure 1). The regression of spinal level was noted in all the cases in the upper thigh. This was taken as 0 hours. Afterwards, the patients were asked to report VAS scores every one hour and intravenous ketorolac 30 mg was administered on pain or if the VAS scores were more than 4. The time to first analgesia was noted as the duration of analgesic techniques. The study duration was only up to the time of first analgesic request. Any untoward event was noted.

III. Results:

All the five patients underwent surgery and anaesthesia without any problems. The demographic data is tabulated.

Table 1 showing demographic data.

Cases	Age in years	ASA	Weight (kg)	sex
1	27	1	56	M
2	29	1	65	F
3	34	1	64	M
4	42	1	67	M
5	54	2	62	M

The duration of anaesthesia, surgery, time to first analgesic request(duration) were noted and tabulated below

Table 2 showing duration of anaesthesia, analgesia

cases	Anesthesia (minutes)	Surgery (minutes)	Analgesia TFA in minutes	Complications
1	140	90	845	nil
2	145	100	820	nil
3	155	105	835	nil
4	150	95	890	nil
5	160	105	880	nil

It is clear from the table that all surgeries were completed within the duration of spinal anaesthesia and there were no hiccups. The time to first analgesic request was around 14 – 15 hours in all the cases. The mean VAS scores were below four in all the readings in all the cases up to around 14 hours in all the cases. There were no complications.

IV. Discussion:

Effective postoperative pain control is an essential and integral component of the perioperative care of the surgical patient. Inadequate analgesia, apart from being inhumane, may result in increased morbidity or mortality. Pain after knee surgeries is unique in that it not only increases routinely described morbidity, it causes deficient mobilization which is essential in a postoperative patient after knee surgeries. Various options like opioids, NSAIDs, Paracetamol are described with differing side effects³. Regional anaesthesia with epidural is associated with motor block and hemodynamic side effects⁴. After the invention of ultrasound and its use in identification of individual planes and nerves, the blocks for pain relief has gained importance. Fowler et al³ has described that administration of epidural analgesia is equianalgesic with femoral catheters but with more side effects. Femoral nerve catheters were used for the same purpose. The only deficiency associated with its use prolonged motor blockade and the inability to mobilize. Femoral neuritis and falls were associated with femoral catheters. The saphenous nerve is the most important sensory component of the femoral nerve which can be accessed in the adductor canal. Hence allowing a motor movement is a distinct possibility with this (ACB) adductor canal block^{5,6}. ACB is an emerging regional technique for postoperative analgesia after knee surgery and is as effective as femoral nerve block in postoperative pain control. The main advantage of ACB is preserving or minimal reduction in quadriceps strength that facilitates ambulating and rehabilitation after knee surgery⁷. This precise location and administration of local anaesthetic drugs are feasible only with use of ultrasound. Ludwigson JL et al⁸ have described that single shot adductor canal block is either or better than the continuous femoral catheters in pain relief after knee surgeries. Hence in our case series, we decided to go ahead with single shot adductor canal blocks. In our cases, we had excellent pain relief for almost 14 hours. Usually femoral component is only taken care of after knee surgeries but not the sciatic component. Novel regional plane block⁹ with deposition of local anaesthetic in the plane between popliteal artery and the capsule of the knee joint is supposed to target the end nerves of the sciatic nerve with innervation to the knee joint. Hence we combined the IPACK block with adductor canal block to deafferent completely the knee joint. As it is a plane block it depends on the volume and hence we used around 20 ml of 0.25% bupivacaine. We gave only 10 ml of the same local anaesthetic in adductor canal block which clearly is below the toxic range. Our limitations are that we did not measure serum bupivacaine concentration and we did not extend the study beyond the duration of early analgesia i.e around 14 hours. As the study was mainly for the intensity of block and duration; we did not get into the effects of late motor blocks and possible mobilisation problems. Our technique is a single shot block and it is unlikely to cause major motor deficiencies.

V. Conclusion:

Combined administration of ultrasound guided adductor canal and IPACK block (interfascial plane between popliteal artery and capsule knee) is very effective in providing early postoperative analgesia in patients undergoing arthroscopic ACL repair without any side effects. This type of precise blocks is only feasible because of the actual visualisation of the nerve and plane with ultrasound.

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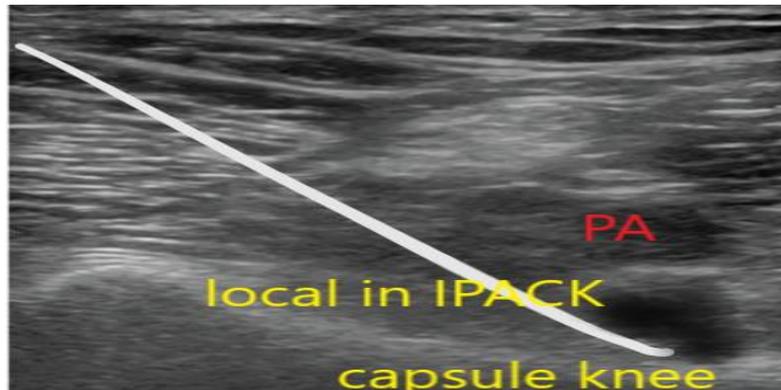


Figure 1 showing IPACK block with drawn needle

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