Ultrasound-guided pulsed radiofrequency between the popliteal artery and capsule of the knee (R-PACK); a new technique for relief of chronic posterior knee pain

Sir,

Regional anaesthesia techniques including femoral, popliteal nerve and adductor canal block are effective methods used in the management of knee pain.[1] With the increasing use of ultrasound for regional anaesthesia and pain medicine, newly defined blocks have become popular. Infiltration between popliteal artery and capsule of knee (iPACK) block is a recently developed technique for the management of perioperative and chronic knee pain.[2] The most noticeable advantages of this technique are its safety, sonoanatomical simplicity and nerve sparing characteristic.[3,4]

Radiofrequency (RF) of sensory branches innervating the knee joint is an alternative intervention for patients with refractory knee pain to conventional therapy and invasive procedures. Herein we report performing pulsed RF targeting the area between the popliteal artery and capsule of the knee (R-PACK) in two patients with persistent knee pain.

A 25-year-old female who had a previous history of total knee arthroplasty after a traumatic accident, presented to our pain clinic suffering from severe knee pain localised in the left posterior fossa for one year. Inspite of medication and physiotherapy management, the pain caused functional difficulty in daily life. Numerical rating scale (NRS) score was 4 at rest, 7 at movement. We decided to perform an ultrasound-guided iPACK block. With the patient in the prone position, a 6-15 MHz high-frequency linear transducer was placed at the medial knee joint to identify the femoral condyle with the common peroneal and tibial nerves. At this level, the needle was advanced in the lateral to medial direction using an in-plane approach until the needle tip was located between the popliteal artery and capsule of the knee. A twenty milliliters mixture of bupivacaine 0.25% and dexamethasone 8 mg was injected. The patient's NRS score was 1 at the end of the procedure and maintained during the two weeks follow-up. The patient was referred to our clinic with returned pain. We hypothesised that treatment of chronic pain by RF in the same area might be beneficial because of the nature of the pain and the benefit of iPACK before. We then administered an ultrasound-guided R-PACK with the technique previously described with a 22-gauge 100-mm RF cannula [Figure 1]. Sensory stimulation at 50 Hz was applied to induce discomfort, like the usual pain of the patient. Motor stimulation of 2 V at 2 Hz was tested for the absence of fasciculation in the lower extremity to prevent the inactivation of the motor nerves. Then, pulsed RF was performed for 10 minutes, with a pulse-width of 10 ms and 60 V with the temperature set at 42°C.

The second patient was a 78-year-old female who was given RF ablation of three main genicular nerves one year ago, and she still had pain unresponsive to paracetamol and physical therapy in the posterior fossa. She also presented with opioid intolerance. Higher doses of pregabalin and commencement of additional drugs were not suitable due to multi drug use. Encouraged by the first case, we decided to perform ultrasound-guided R-PACK with the technique previously described. After the procedure, the patient's NRS scores decreased in the 2nd week, 1st, 3rd, and 6th months. Physical Component Scores (PCS-12), Mental Component Scores (MCS-12) and Beck Depression Inventory (BDI) scores also improved [Table 1]. There were no block-related adverse events and no clinically apparent motor blockade.

Sensory innervation of the posterior aspect of the knee is provided by common peroneal (L4-S2), and tibial (L4-S3) nerves and the posterior branch of the

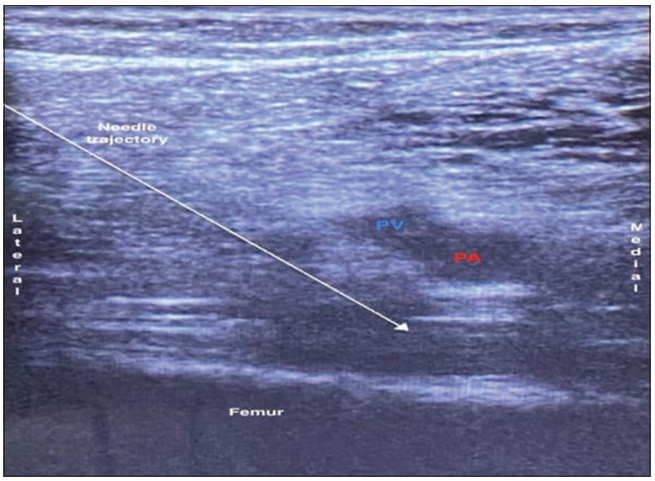

Figure 1: Ultrasound image demonstrating relevant sonoanatomy for the pulsed radio frequency between the popliteal artery and capsule of the knee (R-PACK). White line: Possible needle trajectory, PA: Popliteal artery, PV: Popliteal vein

Table 1: NRS, BDI, PCS-12, and MCS-12 scores of patients		
	Patient 1	Patient 2
NRS		
Pre-procedure	7	6
2nd week	2	3
1st month	2	2
3rd month	3	2
6th month	2	3
PCS-12/MCS-12		
Pre-procedure	24.9/23.6	35.18/33.52
6th month	46.9/53.1	44.25/41.64
BDI		
Pre-procedure	28	16
6th month	20	10

NRS: Numerical Rating Scale, PCS: Physical Component Scores, MCS: Mental Component Scores, BDI: Beck Depression Inventory

obturator nerve (L2-L4).[5] Current anatomical targets for RF ablation techniques consist of periarticular genicular nerves providing sensory innervation to the anterior side of the knee.[6]

To summarise, this modified novel technique for posterior chronic knee pain showed successful control of pain for a six-month follow-up period. We suggest that further prospective clinical studies are required to demonstrate the efficacy of R-PACK.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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