Outcome of arthroscopic radiofrequency denervation of the patella in the management of resistant patellofemoral pain syndrome

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Background
Patellofemoral pain syndrome is common in females as well as young active adults. The aim of the current study was to assess the outcome of arthroscopic radiofrequency denervation of the patella in patients with resistant patellofemoral pain syndrome.
Patients and methods
Thirty-two patients with patellofemoral pain syndrome were included, after failure of conservative treatment for at least 6 months. Exclusion criteria included lower limb malalignment, patellofemoral instability, or associated meniscal or knee ligamentous injuries. Arthroscopic patellar denervation was performed using a radiofrequency ablation device.
Results
The average duration of follow-up was 36.8 months (range, 24–48 months). At the final follow-up, the postoperative pain visual analog score improved from 7.4 (range, 5–9) preoperatively to 2.3 (range, 1–4). The postoperative Lysholm score improved significantly from 63.5 (range, 56–71) to 90.5 (range, 86–95) ($P<0.0001$), while the Kujala score improved significantly from 70.75 (range, 62–81) to 88.5 (range, 81–96) ($P<0.0001$).
Conclusion
Arthroscopic patellar denervation is a simple procedure that yields good results and no complications in the management of resistant patellofemoral pain syndrome.

Keywords:
arthroscopic patellar denervation, patellar denervation, patellofemoral pain

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Introduction

Patellofemoral pain syndrome is anterior knee pain that is increased by ascending or descending stairs or prolonged sitting with bent knees in the absence of significant structural changes. It is common in females as well as young active adults [1,2].

Although patellofemoral maltracking can cause patellofemoral pain, in most cases, no clear cause can be identified and pain is referred to overuse [3]. Conservative management in the form of physiotherapy and modification of activities is effective in most patients. The roles of chondroprotective drugs and viscosupplement injections are not clear [4].

In advanced patellofemoral arthritis, patellofemoral resurfacing is an option alone or concomitant with total knee replacement. Recent studies, however, showed better clinical results with circumpatellar electrocautery denervation in the management of anterior knee pain after total knee replacement [5].

The aim of the current study was to assess the outcome of arthroscopic denervation of the patella using a radiofrequency ablation device in the management of resistant patellofemoral pain in the absence of malalignment or patellofemoral maltracking.

Patients and methods

During the period from October 2011 to November 2014, 32 patients with patellofemoral pain were enrolled in the current study. The study was approved by the ethical committee of Benha University. All patients were operated upon in Benha University Hospital after they signed an informed consent.

There were 20 female patients and 12 male patients, with a mean age of 34.5 years (range, 23–45). The inclusion criteria were patellofemoral pain syndrome with failure of conservative treatment for at least 6 months. Exclusion criteria were as follows: (a) lower

limb malalignment, (b) patellofemoral instability with trochlear dysplasia and patella alta, and (c) associated synovial plica, or meniscal or knee ligamentous injuries that required surgical repair diagnosed before surgery or during arthroscopy.

Clinical assessment

Patients' age, sex, detailed history, and clinical examination for the assessment of patellofemoral pain and patellar tracking were recorded.

Visual analog score (VAS) for anterior knee pain, Kujala, and Lysholm knee scores were recorded. Radiological assessment included knee anteroposterior, lateral, and merchant views. Patella alta was defined by Caton–Deschamps index more than 1.3, valgus malalignment more than 15°, and excessive femoral anteversion more than 20. All patients underwent an MRI to exclude other causes of anterior knee pain.

Surgical technique

All patients underwent surgery under spinal anesthesia using a tourniquet. Patients were placed in the supine position. Routine anterolateral portal and anteromedial portal were initially used, followed by the superolateral portal, which was marked from outside using a spinal needle just above the superolateral angle of the patella.

Routine knee arthroscopy was performed to address patellofemoral tracking, any patellofemoral cartilaginous lesion that was graded according to the Outerbridge classification [6], any synovial plica, and any concomitant intraarticular lesions (patients with any of the above were excluded from the study). The concomitant chondral lesions are summarized in Table 1.

After debridement of synovitis, a monopolar radiofrequency ablation probe (Arthrex, Arthrex's Global Headquarters, Southwest Florida, USA) was used to ablate the peripatellar synovium just adjacent to the patella, except at patellar tendon insertion for a depth of 2–4 mm. With the scope in the anterolateral portal, the radiofrequency probe could access the synovium along the medial patellar border easily. Switching portals, the probe could access the lateral border of the patella (Fig. 1). With the radiofrequency probe in the superolateral portal, it could reach the upper border of the patella (Fig. 2).

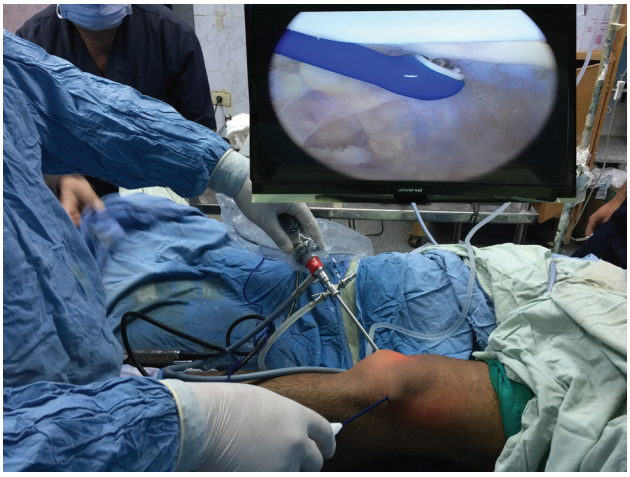
Table 1 Patellofemoral chondral lesion according to the Outerbridge classification system

Grade of lesion	Number of cases
Grade 0	12
Grade 1	20
Grade 2	0
Grade 3	0

Postoperative follow-up

Compressive bandage was used till stitch removal. Weight bearing was allowed as tolerated and no special brace was used. The rehabilitation protocol was then followed for 6 weeks that focused on regaining quadriceps function and size, which were affected in all patients.

Figure 1



With the scope in the anteromedial portal and the probe in the anterolateral portal, the synovium along the lateral patellar border could be ablated.

Figure 2

With the scope at the anterolateral portal and the radiofrequency probe at the superolateral portal, the synovium along the upper border of the patella could be reached.

Postoperative pain VAS, Kujala score, and the Lysholm knee score were recorded 6 months postoperatively and at the final follow-up. Postoperative radiograph (anterioposterior, lateral, and merchant views) were obtained at the final follow-up and compared with preoperative radiograph to record the development of patellofemoral arthritic changes.

Results

The average duration of follow-up was 36.8 months (range, 24–48). At the final follow-up, the postoperative pain VAS improved from 7.4 (range, 5–9) preoperatively to 2.3 (range, 1–4). The postoperative Lysholm score improved from 63.5 (range, 56–71) to 90.5 (range, 86–95), while the Kujala score improved from 70.75 (range, 62–81) to 88.5 (range, 81–96). All these results were statistically significant, with *P* value less than 0.0001.

There were no significant changes in Lysholm or Kujala scores 6 months postoperatively and at the final follow-up ($P<0.0001$). Radiographic evaluation at the final follow-up showed no significant patellofemoral arthritic changes.

Discussion

Denervation as a treatment modality was used long time ago in the management of trigeminal neuralgia and chronic wrist pain [7]. After various anatomical studies that showed rich parapatellar soft tissue innervation and nociceptors, patellar denervation has been used in total knee replacement as an alternative to patellar resurfacing, with encouraging results [5].

Moreover, some investigators based their anatomic and histocytologic studies on the dense distribution of substance P producing nociceptors in the retinacular tissue around the patella and postulated a neuropathic theory as a source of anterior knee pain [8,9]. This makes denervation of the patella a reasonable treatment modality.

Since Vega *et al.* [10] published their good preliminary results of arthroscopic patellar denervation in 10 patients with patellofemoral pain syndrome, we could not find similar case series in the literature, except for that published by Zhao *et al.* [11], which included patients with patellofemoral arthritis. Our results with 32 knees and follow-up for at least 24 months (average, 36.8) have shown comparable good results.

In the study of Zhao and colleagues, the Lysholm score improved from 73.29±4.48 to 80.93±4.21 and the Kujala score improved from 68.34±6.22 to 76.48 ±6.54. They followed up 149 patients for 10–24 months. Our results of 32 patients followed up for 24–48 months showed an increase in the Lysholm score from 63.5 (range, 56–71) to 90.5 (range, 86–95) and in the Kujala score from 70.75 (range, 62–81) to 88.5 (range, 81–96). The younger age of our patients (average, 34.5 years) compared with the patients in the Zhao study (average 66 years), and their inclusion of patellofemoral arthritic patients explain our better scores.We did not encounter complications related to the surgical procedure. The rich blood supply of the patella, the superficial radiofrequency ablation (2–4 mm), and sparing of the infrapatellar vessels at patellar tendon insertion markedly decrease the risk of devascularization of the patella and possible avascular necrosis. This was not recorded after widespread practice of patellar denervation with total knee replacement surgeries [12].

Conclusion

Arthroscopic patellar denervation is a simple procedure that yields good results and leads to no complications in the management of resistant patellofemoral pain syndrome. Controlled trials of its use alone or in conjunction with other patellofemoral surgeries are recommended.

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Conflicts of interest

There are no conflicts of interest.

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