# TenJet™ for Definitive Treatment of Chronic Aseptic Prepatellar and Olecranon Bursitis– A Case Series

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## Abstract

Bursitis is a common cause of joint pain in adults and can affect any bursa throughout the body.[1] Due to the superficial location they are more prone to injury from blunt trauma, prolonged pressure, and overuse.[8] Acute bursitis typically resolves with conservative management, including joint protection, ice, compression, and non-steroidal anti-inflammatory medications.[5,8] However, repetitive microtrauma resulting in thickening of the bursal capsule can lead to chronic bursitis which requires more invasive surgical management.[5,8] If left untreated, chronic bursitis can cause significant debility from contracture and muscle atrophy[8]. Recent studies favor arthroscopic intervention over open surgery due to decreased risk of infection, subcutaneous hematoma formation, and shorter recovery time; however, arthroscopic bursectomy is not without risk.[6] This Case Series will discuss the use of TenJet™ for subcutaneous bursectomy in nine cases of chronic aseptic olecranon and prepatellar bursitis. The TenJet™ offers a less invasive alternative to arthroscopic bursectomy with a lower risk for infection and damage to proximal structures, including nerves, vessels, and the patellar tendon[3,7].

## Bursitis Background

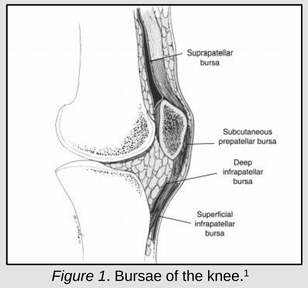


*Figure 1.* Bursae of the knee.[1]

A bursa is a fluid-filled sac that is lined with synovial membrane which provides mobility between musculoskeletal structures[6]. Deep bursa provides lubrication for movement between bone and muscle, but superficial bursae lie deep to the skin allowing cutaneous structures to glide over bone prominences. There are multiple superficial bursae including: olecranon, ischial, retrocalcaneal and prepatellar[8]. Bursitis refers to inflammation of the bursal sac, however it does necessarily imply a concurrent infection. Non-infectious bursal inflammation can result from various etiologies such as trauma, prolonged pressure, overuse, crystal diseases, inflammatory arthritis, rheumatoid arthritis, chronic steroid use, calcinosis, Raynaud phenomenon, esophageal dysmotility, sclerodactyly, and telangiectasia (CREST) syndrome[1,2,8]. Non-infectious bursitis can also occur from predisposing conditions such as diabetes, HIV, metastatic cancer, and chronic kidney disease requiring hemodialysis[2].

Acute traumatic bursitis from blunt trauma results in inflammation and hemorrhage surrounding the bursa. Acute bursitis typically resolves with conservative treatment including joint protection, compression, and non-steroidal anti-inflammatory medications[5]. Chronic aseptic bursitis most commonly from repetitive microtrauma causes inflammation and thickening of the bursal sac[4]. Due to thickening of the sac, chronic bursitis often fails conservative management requiring more invasive intervention, including arthroscopic or open bursectomy.

## TenJet™ Technology

The Tenjet™ device was introduced in 2015 and is FDA approved for treatment of tendon pathology that has failed conservative measures (Figure 1). Tenjet™ allows for minimally invasive percutaneous tenotomy procedures to be done under local anesthesia in an outpatient setting. The device uses high velocity stream of saline to debride degenerative tendon or fascia while avoiding damage to the surrounding healthy tendon tissue.[4]

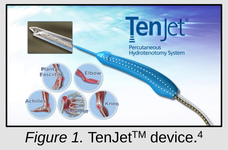


*Figure 1.* TenJet™ device.[4]

The device consists of a 12-gauge needle with a two-channel system that uses the Venturi vacuum effect to evacuate the debrided damaged tissue. The Venturi effect describes the generation of a vacuum force that occurs when a fluid flows from an area of a large diameter to an area of a reduced diameter, resulting in an increase in the fluid's velocity and subsequent decrease in pressure creating a suction force (Figure 2).[10]

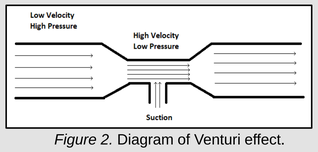


*Figure 2.* Diagram of Venturi effect.

## Case Series

Patients presented with longstanding, chronic pain for months with diagnosed bursitis confirmed with diagnostic ultrasound in the office and prior to the procedure. All patients had failed conventional conservative treatment including bracing, physical therapy, time, and activity modification. The pain associated with this condition was interfering with the patients' activities of daily living. The decision was made after discussion about risks, benefits, and alternatives to undergo ultrasound guided percutaneous tenotomy to improve patients' symptoms and function.

*Figure 3.* Left: Chronic left olecranon bursitis. Middle: Chronic right prepatellar bursitis. Right: Ultrasound image of prepatellar bursitis.[5]

The olecranon or prepatellar bursa was identified utilizing ultrasound. The area was prepped with cloraprep and anesthetized with 1% plain xylocaine, approximately 5 cc using 23-gauge needle. A #11 blade was used to puncture the skin to the site of the pathologic tissue. The Tenjet™ device was entered through the incision and a near complete evacuation of bursal products was completed. Steri-strips followed by a Tegaderm were applied to incision. All patients tolerated the procedure well and were discharged from the ambulatory surgery center in good condition.

**Table 1. Summary of chronic subcutaneous hematomas**

| Case | Sex | Age | BMI | Comorbidities | Type of Bursitis | Follow-up |
|---|---|---|---|---|---|---|
| 1 | M | 52 | 28.17 | Current oral tobacco, Neutropenia, Diabetes Mellitus Type 2 | L olecranon bursitis | Complete resolution at 2 week post-operative visit. |
| 2 | M | 48 | 22.52 | Former smoker | R olecranon bursitis | Complete resolution at 2 week post-operative visit. |
| 3 | M | 56 | 37.06 | Current Smoker, Antithrombin III Deficiency, Claudication, Peripheral Neuropathy, Obesity | L olecranon bursitis | At 2 week post op follow up had continued swelling and was prescribed 5 days of 50mg Prednisone daily.<br><br>At 4 week follow up had continued swelling and was treated with intra-bursal Depo-Medrol 80mg injection. |
| 4 | F | 71 | 24.90 | Former smoker, Osteoarthritis | L prepatellar bursitis | At 6 week follow up, small effusion present treated with knee intraarticular Zilretta injection with complete relief. |
| 5 | M | 25 | 22.30 | Non-smoker, Treacher Collins syndrome | R prepatellar bursitis | Complete resolution at 2 week post-operative visit. |
| 6 | F | 29 | 25.25 | Non-smoker | R prepatellar bursitis | Complete resolution at 4 week visit. |
| 7 | M | 69 | 35.20 | Current smoker, Gout | L olecranon bursitis | Complete resolution at 8 week post-operative visit. |
| 8 | F | 46 | 36.71 | Former smoker, Breast Cancer, Amaurosis Fugax, Transient Ischemic Attack, Osteoporosis | R olecranon bursitis | Complete resolution at 2 week post operative visit. |
| 9 | M | 85 | 24.90 | Non-smoker, Osteoarthritis, Raynaud's Syndrome, Coronary Artery Disease s/p Myocardial Infarction | R prepatellar bursitis | Complete resolution at 4 week post operative visit. |

## Conclusion

Seven of the nine cases experienced complete resolution of pain and edema from bursitis following TenJet™ bursectomy. Five patients had improvement in pain and swelling by two-week follow-up visit with four of the five with complete resolution. A sixth patient had complete resolution at four-week follow-up. One patient had complete resolution of pain at eight-week follow-up. Two patients required intra-articular steroid injections, one also requiring a trial of oral Prednisone.

## Discussion

TenJet™ was found to be an effective less invasive alternative to arthroscopic bursectomy. Arthroscopic bursectomy procedures require multiple incisions for each port compared to a single incision needed for the TenJet™ device, thus decreasing the risk for post-operative infection.[7] In addition, arthroscopic bursectomy often utilizes an endoscopic shaver to debride the thickened bursal capsule, increasing risk of neurovascular damage and post-operative patellar tendon rupture.[3,7] Both procedures can be done in an out-patient setting under local anesthesia.[3,6]

Two patients in this study required intra-articular corticosteroid injection and one needing oral corticosteroid trial due to residual joint effusion at treated joint. Although both these patients had a history of tobacco smoking, tobacco use did not appear to correlate with poorer outcomes in this study. It is possible that comorbidities affecting healing ability may account for these outcomes. More research is needed to determine which candidates are most likely to benefit from the TenJet™ percutaneous bursectomy.

## References

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