A Novel Application of Bipolar Radiofrequency in Small Ankle Joints for Arthroscopic Synovectomy

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INTRODUCTION

Technological innovations have allowed easier access into smaller joints. When conservative therapy fails, synovitis is treated by arthroscopic synovectomy using mechanical abraders[1,2]. Plasma-mediated bipolar radiofrequency-based (pmBRF) technology is increasingly being used as an adjunct during synovectomies in the shoulder and knee; however, its use remains uncommon in smaller joints such as the ankle (Figure 1-3). The purpose of this study was to evaluate feasibility of using RF-based methods in smaller joints and to assess early-term clinical effectiveness.

FIGURE 1
Osteochondral defect with synovitis

FIGURE 2
Proliferative synovitis – inflammation of synovial tissue is apparent in redness of soft-tissue.

FIGURE 3
Lateral Ankle Impingement – Overgrowth of the tallus budding over and impinging fibula would be smoothed with plasma-mediated radiofrequency-based device.

MATERIALS & METHODS

Patients diagnosed with synovitis and lateral ankle impingement were considered for treatment. Ankle synovectomies and abrasion chondroplasties were arthroscopically performed using a plasma-mediated bipolar radiofrequency-based device designed for ablating synovial and chondral tissues (Figure 4-9). Post-operative therapy consisted of analgesics, immobilization, compression stockings but no physical therapy; it also consisted of below knee cast, Cam Walker, Unna Boot and gradual return to normal shoe gear. Clinical effectiveness was evaluated using subjective pain scale and functional capability for walking distance and climbing stairs. Statistical analysis was performed using SPSS 14.0 (SPSS, Inc, Chicago, IL). Non-parametric Wilcoxon tests were performed to compare pre-operative and post-operative results.

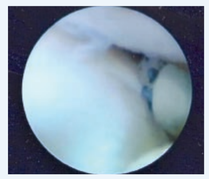


FIGURE 4
pm-BRF device ablating osteochondral defect.

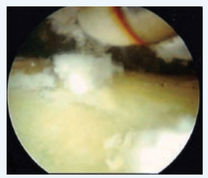
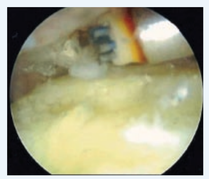


FIGURE 5



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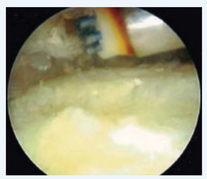

FIGURE 7

Post Traumatic Ankle Osteoarthritis. Cleaning of the joint and smoothing of the chondral tissue with pmbRF-based device.

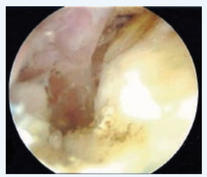

FIGURE 8
Inflammation of the medial gutter of the ankle joint.

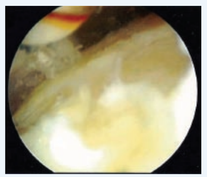

FIGURE 9
pm-BRF device ablating inflamatory tissue in joint.

RESULTS

Average age of treated patients (n=39) was 46.8±11.3 years; 17 (44%) were male. Ninety percent of patients were treated for synovitis and 64% for lateral ankle impingement (Table 1). No peri-operative complications were observed. Most patients (88%) had switched to sneakers and 12% had switched to orthopedics shoes by 6 weeks. Pain was significantly decreased from baseline (8±1 vs. 2±1; p=0.000). Patients climbed significantly more flights of stairs (2±1 vs. 7±3; p=0.000) and walked pain-free for 14±4 blocks compared to 3±1 blocks at baseline (p=0.000) (Table 2). Post-operative residual pain was completely resolved by 1 year.

Table 1. Baseline Characteristics

N=39	# (%)	Mean ± SD
Age (years)		**46.8 ± 11.3**
Sex		
Male	17 (44%)	
Female	22 (56%)	
Synovitis Diagnosis	35 (90%)	
Lateral Ankle Impingement Syndrome	25 (64%)	
Other Medical Conditions:		
Ankle Osteoarthritis	10 (26%)	
Osteochondral Defect	4 (10%)	
Diabetes	13 (33%)	

Table 2. Clinical Outcomes

N=39	Pre-op	Post-op	p-value
Pain scale	8 ± 1 [6-10]	1.6 ± 1 [0-4]	0.000
Pain-free walking (Blocks)	3 ± 1 [1-5]	14 ± 4 [7-20]	0.000
Climbing flights of stairs	2 ± 1 [0-4]	7 ± 3 [3-15]	0.000

CONCLUSION

Patients reported considerable pain relief and faster healing probably due to less surgical trauma compared to conventional treatments. This new approach provides an excellent method for using pmBRF in small joints.

REFERENCES

1. Bynum CK. Tasto J. Arthroscopic treatment of synovial disorders in the shoulder, elbow, and ankle. J Knee Surg 2002; 15: 57-59.
2. Martin DF. Curl WW. Baker CL. Arthroscopic treatment of chronic synovitis of the ankle. Arthroscopy 1989; 5: 110-114.