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Arthroscopic Treatment of Anterior Ankle Impingement

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Abstract

Background and objectives: Anterior ankle impingement (as a common cause of anterior ankle pain) is becoming recently a common diagnosis in peoples who do excessive dorsiflexion of ankle joint in their daily activities. Arthroscopic debridement is nowadays a gold standard procedure for anterior ankle impingement treatment in both osseous and soft tissue type impingements. The objectives of this study are to provide a comprehensive overview of the clinical outcomes of arthroscopic procedures used as a treatment strategy for anterior ankle impingement. **Methods:** We performed a prospective study on 20 patients diagnosed as cases of anterior ankle impingement on the basis of clinical and radiological examination, the patients complained from either soft tissue or bony impingement. All patients were treated by arthroscopic debridement or burring. Clinical outcome was evaluated according to American orthopedic foot and ankle society score questionnaires, visual analogue scale, and ankle dorsiflexion range achieved. Results: The mean age of the patients was 37.4 year, mean AOFAS ankle hind-foot scale improved from 52.65 preoperatively to 86.95 postoperatively (statistically significant). The mean pain visual analogue scale decreased from 7.9 to 3.1. The mean dorsiflexion angle increased from 7 degrees to 14.5 degrees. **Conclusions:** Arthroscopic debridement and excision of impinging soft tissues and burring of impinging bones is the treatment of choice for patients with anterior ankle impingement syndrome of both osseous and soft tissue nature after failure of conservative measures to relieve the symptoms and improve the range of motion.

Keywords: Anterior ankle impingement syndrome, Arthroscopic, Debridement.

Introduction

Anterior ankle impingement can be described as anterior ankle pain which is associated with restricted dorsi-flexion of the foot. It is a common cause of chronic anterior ankle pain and is usually common in individuals who sustain repetitive dorsiflexion movements[1-2]. We can deal with two separate entities; which are osseous or bony impingement and soft-tissue impingement. We can also make a distinction clinically based on the localization of the pathology and the symptomatology, which includes anterolateral impingement (ALI) and anteromedial impingement (AMI). Soft-tissue impingement is often located at the anterolateral aspect of the ankle, whereas bony impingement is predominantly located anteromedially[3-4]. The etiopathogenesis lies with repeated trauma at the level of tibiotalar sulcus causing soft tissue injury with extravasation of inflammatory mediators causing hypertrophy of synovial tissue and/or new bone formation (osteophytes). There have been cases where osteophytes were found as an intra/extra-articular loose body causing secondary osteoarthritis[5-6]. The anatomical structures that causes soft tissue impingement includes anteroinferior portion of the anterior talo-fibular ligament (meniscoid lesion), hypertrophied anterolateral synovium and distal fascicles of the anterior inferior tibio-fibular ligament (Bassett or syndesmotic ligament)[7-8]. The mainstay of diagnosis is usually by clinical symptomatology along with radiological evidences (x-ray for bony impingement and MRI for soft tissue impingement). The patient typically presents with pain, recurrent swollen ankle with a positive dorsal impingement sign at anteromedial or anterolateral aspect of ankle joint. A history of repeated hyper-dorsiflexion and recurrent inversion injuries can be a clue to the diagnosis[9-11]. Conservative treatment, which consists of rest, physical therapy, ankle bracing, shoe modification and/or local injection, is recommended as the primary line of treatment for symptoms of anterior ankle impingement. In cases in which primary line of conservative treatments

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are unresponsive to reduce inflammation, an intra-articular corticosteroid injection can be applied. But when all types of conservative treatment are unhelpful to relieve symptoms, resection of the soft tissue and/or osteophytes is often required[12-14]. Good results have been reported by a number of authors with traditional open arthrotomy, but the procedure is associated with some complications, such as wound dehiscence, iatrogenic damage to the long extensor tendons, cutaneous nerve entrapment, and formation of hypertrophic scar tissue[15-16]. The understanding of ankle impingement and chronic ankle pain has been furthered by the growing popularity and efficacy of ankle arthroscopy; it is now considered as a safe and effective procedure[17-18]. This study aims to provide a comprehensive overview of the clinical outcomes of arthroscopic procedures that are used as a treatment strategy for anterior ankle impingement.

Patients and Methods

This was a prospective study, which was carried out over a period of (13 months) (1st of September 2017 to 30th of September 2018) in one hospital; all surgeries were done by one surgeon. All patients were complaining from anterior ankle pain with pain during ankle dorsiflexion, not responding to conservative treatment (rest, activity modifications, non-steroidal anti-inflammatory drugs and steroid injections) for at least 3-6 months. Exclusion criteria included: patients with rheumatologic diseases, posterior ankle pain associated with posterior osteophytes, previous surgery of the affected ankle, presence of loose bodies, subtalar/midtarsal arthritis and ankle instability. All patients were above 26 years of age. Complete history, systemic and local examinations, radiological investigations such as x-ray of the ankle (anteroposterior, lateral and oblique views) and MRI of the ankle were done for all patients; other relative investigations were done whenever required. Injection of 2ml Lidocaine for confirming the diagnosis has been used as a second check before surgery. Parenteral antibiotics (ceftriaxone 1 g) and pain killers were administered as needed. The temporary compressive bandage, ice packing was provided for 24-48 hours and the affected part was elevated. Parenteral antibiotic (ceftriaxone 1 g) was given for all patient 30 minutes before operation, operations were done under general or spinal anesthesia, in supine position, pneumatic tourniquet was used in the mid-thigh for all patients, and a leg holder was used to elevate the required foot, and a distractor (made by bandage) was used to distract the ankle joint and to do inversion or eversion of the foot as required. Joint lines, medial and lateral malleoli, tibialis anterior tendon, saphenous nerve and vein and the ports were all marked on the skin. The ankle joint was distended at the start with 20 cc of normal saline (which will be drained at the end through the portals made) then the first portal was done Anteromedial, medial to tibialis anterior and lateral to medial malleolus between tibialis anterior and saphenous vein, and the second portal was done anterolateral, just lateral to peroneus tertius and superficial peroneal nerve and medial to lateral malleolus. The impinging soft tissues were debrided using shavers or by cauterization, while the impinging bones were dealt with using burrs. At the end of the procedure, each portal was closed with a single suture, drain was not used in any case, wound covered with sterile gauze, cotton and bandage, the tourniquet was deflated and there was no need for any casting. The leg was elevated post operatively with ice packing, all movements were allowed with full weight bearing. The patients were discharged from hospital at the same day or after 24 hours accordingly. Antibiotics were given (ceftriaxone 1 g intravenous (IV) BD) for 5 days with pain killers (acetaminophen and mefanamic acid). First follow-up was after 12 days during which sutures were removed, sterile dressing was done using povidon-iodin solution if required. All patients were monitored regularly for 6, 12 and 24 weeks, the outcome was evaluated according to the American Orthopaedic Foot and Ankle Society (AOFAS) score questionnaires table 1, the visual analogue scale (VAS) score, which is evaluated by instructing the patient to point to the position on the line between the faces from zero (no pain) to 10 (unbearable pain) to indicate how much pain he is currently feeling, and lastly, range of ankle dorsiflexion achieved. This study was approved by the ethics committee in Kurdistan Board for Medical Specialties, No. 62, on 8th of January, 2019.

Table (1): AOFAS score

Ankle-Hind foot Scale (100 points Total)		
Parameters: (90+ excellent, 75-89 good, 50-74 fair, <50 failure)		
1. Pain (40)	2. Function (50)	3. Alignment (10)
	(a) Activity limitation (b) Maximum walking distance, blocks (c) Walking surface (d) Gait abnormality (e) Sagittal motion (flexion plus extension (f) Hind foot motion (inversion plus eversion) (g) Ankle-hind foot stability	

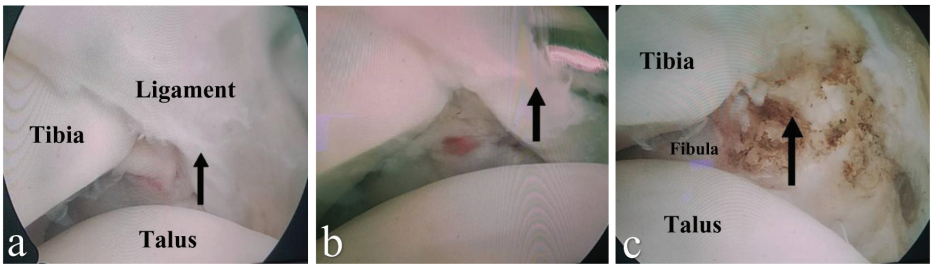

Figure (1): Arthroscopic view of the ankle joint, (a) Pre shaving of impinging soft tissue, (b) during shaving of impinging soft tissue and (c) after shaving is completed.

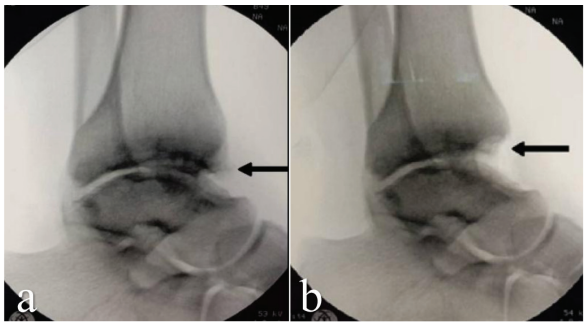

Figure (2): C-arm lateral images of ankle joint showing (a) pre and (b) post burring of anterior bony impingement.

Results

Twenty patients were included in the study. Their mean age + SD were 37.40 + 8.15 years, ranging from 26 to 52 years. The median was 35 years. The age distribution is presented in Table 1 which shows that the majority (80%) of the patients were males. The right side was affected in 60% of the cases. Regarding the duration of symptoms, it was 6-7 months in 45% of the patients, and ≥ 10 months in 20% of the patients, Table 1.

Table (2): Basic characteristics of the study sample.

Basic characteristics	No.	(%)	Mean	(±SD)
Age (years)				
< 30	3	(15.0)	37.40	(±8.15)
30-34	6	(30.0)		
35-39	3	(15.0)		
≥ 40	8	(40.0)		
Gender				
Male	16	(80.0)		
Female	4	(20.0)		
Side				
Right	12	(60.0)		
Left	8	(40.0)		
Duration of symptoms (months)				
6-7	9	(45.0)	8.10	(±1.68)
8-9	7	(35.0)		
≥ 10	4	(20.0)		
Total	20	(100.0)		

Three prognostic indicators are presented in Table 2 which shows that the mean and median dorsiflexion angle increased from 7 degrees (in the pre-operative period) to 14.5 degrees in the post-operative period, p-value < 0.001. The mean pain visual analogue scale (VAS) decreased from 7.9 to 3.1 (before vs. after the operation), and the median decreased from 8 to 3, p-value < 0.001. The mean AOFAS increased from 52.65 to 86.95, and the median from 54 to 86.5, p-value 0.001.

Table (3): Pre and post-operative indicators.

Indicators	Pre-operative				Post-operative				
	Mean	Median	Min	Max	Mean	Median	Min.	Max	p-value
Dorsiflexion	7.00	7.00	4	10	14.50	14.50	11	17	< 0.001
VAS	7.90	8.00	7	10	3.10	3.00	1	6	< 0.001
AOFAS	52.65	54.00	40	65	86.95	86.50	75	95	< 0.001

It is evident in Table 3 that five patients (25%) developed complications after the operation. Two patients developed periportal anesthesia, and the other three patients developed mild persistent ankle pain, mild persistent swelling, and mild portal infection with discharge respectively. Eight patients (40%) resumed activity after 10-11 weeks of the operation, and 5 patients (25%) needed 14-15 weeks to resume their activities.

Table (4): Post-operative complications and period needed to resume activities.

Complications and activity resuming	No.	%
Complications		
No	15	75.0
Yes	5	25.0
Type of complication (n = 5)		
Mild persistent ankle pain	1	20.0
Periportal paresthesia	2	40.0
Mild persistent swelling	1	20.0
Mild portal infection with discharge	1	20.0
Resuming activities (weeks)		
10-11	8	40.0
12-13	7	35.0
14-15	5	25.0
Total	20	100.0

Table 4 shows that there was upgrading of the AOFAS categories before and after the operation. It is evident that 57.1% of those with low scores (failure) before the operation became good, 42.9% became excellent. More than half (61.5%) of those with fair scores became good, and the rest (38.5%) became excellent.

Table (5): AOFAS categories, before and after the operation.

AOFAS pre-operative	AOFAS post-operative				Total	
	Good		Excellent			
	No.	%	No.	%	No.	%
Failure	4	57.1	3	42.9	7	100.0
Fair	8	61.5	5	38.5	13	100.0
Total	12	60.0	8	40.0	20	100.0

Discussion

The results of our study revealed that arthroscopic debridement of anterior ankle impingement in selected patients (according to inclusion and exclusion criteria) has showed great improvement in overall pain and function in the affected ankle with high patient satisfaction.

In the present series, we have studied 20 patients with anterior ankle impingement after failure of conservative treatment. We have compared our observations and results with that of available literatures whenever possible although the present series is relatively small, and period of follow-up was short. In the present series, there were 16 (80%) males and 4 (20%) female patients.

The percentage of male patients was more than that of female patients, and this observation is consistent with the study done by Devgan et al[19], which included 12 (85.7%) males and 2 (14.3%) females, and with the study done by Walsh et al[20], which included 42 (91.3%)males and 4 (8.7%) females, and with the study done by Reynaert et al22, which included 12 (92.3%) males and one (7.7%) female, all the studies show male predominance. In the present series, 12 (60%) patients had impingement in the right while 8 (40%) patients had impingement in the left side and no cases with bilateral involvement, and this is consistent with the study done by Yahia[21], in which there was 13 (52%) right side involvement and 12 (48%) left side involvement, and the study done by Reynaert et al[22], which included 9 (69%) right side involvement and 4 (31%) left side involvement. Male predominance may be attributed to their involvement in heavier works and for longer time in comparison to females, and involvement of the right side more than the left may be because it is the dominant side. In our study, the mean duration between the onset of symptoms till the surgery was 8-10 months (ranging from 6-12 months), which is consistent with the study done by Yahia[21] (8.9) months. In the present series, the clinical outcome was assessed according to the criteria of the AOFAS score, the score improved from 52.65 preoperatively to 86.95 at the final follow-up ranging from 75-95.

In literature reported by Devgan et al[19], the mean preoperative score was 50.5 and the mean postoperative score was 85.71, and in the study done by Yahia[21], the mean preoperative score was 53 and the mean postoperative score was 89. The results are comparable with ours. Also, the VAS was used in the study to assess the clinical outcome, which showed a significant improvement in the score as the mean VAS score decreased from 7.90 preoperatively to 3.10 at the final follow-up ranging from 1-6. In literature reported by Devgan et al[19], we found nearly the same result (7.93 preoperatively, decreased to 2.57 at final follow-up). In the present series, the mean dorsiflexion improved from 7.00º preoperatively to 14.50º at the final follow-up (ranging from 11º-17º). This improvement in dorsiflexion is nearly consistent with the study done by Devgan et al19 (10.79 º-14.79 º), and to some degrees with the study done by Walsh et al[20] (24.7 º-27 º).

This improvement is most probably due to complete debridement and excision of the impinging structures and

immediate post-operative range of motion exercises. In the present series, the common complications included mild persistent ankle pain (1 case), periportal paresthesia (2 cases), mild persistent swelling (1 case) and mild portal infection with discharge (1 case), no major complication. This is consistent with the study done by Devgan et al[19]. According to AOFAS at the final postoperative follow-up evaluation, 8 (40%) patients had excellent results, and 14 (60%) patients had good results, which is nearly consistent with the study done by Yahia[21] which showed 9 (36%) excellent, 14 (56%) good and 2 (8%) fair, and also nearly consistent with the study done by Reynaert et al[22] that showed 7 (54%) excellent, 5 (38%) good and 1 (8%) fair.. There was no bias in the surgeon related factors that could affect the outcomes because only one qualified Ankle and Foot surgeon had performed all the operations. The limitations of our study include small number of patients and the short period of follow-up. However, no recurrence was seen in any of our patients at the time of final follow- up.

Conclusions

Anterior ankle impingement is becoming a more popular diagnosis nowadays. Arthroscopic debridement and excision of impinging soft tissues and burring of impinging bones is the treatment of choice for patients with anterior ankle impingement syndrome of both osseous and soft tissue nature after failure of conservative measures to relieve the symptoms. Ankle arthroscopy offers a safe, good, and effective method in diagnosis and treatment of ankle impingement with fast return to full activities with least complications when done by skilled surgeon.

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