Endoscopic Excision of Os Trigonum in Symptomatic Ballet Dancers of Odisha- A Prospective Cohort Study

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ABSTRACT

BACKGROUND

The purpose of this study was to evaluate the results of endoscopic excision of symptomatic os trigonum in symptomatic ballet dancers of Odisha. The hypothesis was that posterior endoscopic excision of the os trigonum would be safe and effective in treating PAIS related to the os trigonum.

METHODS

Between May 2015 and May 2018, 30 ankles of 20 consecutive patients underwent arthroscopic removal of the symptomatic os trigonum for posterior ankle impingement syndrome (PAIS) in prone position. 12 patients were male, 8 female. All patients were ballet dancers by profession where they do the dance in acute flexion of ankle. All patients were discharged on the same day and allowed full weight bearing after 2 weeks post operatively. Mean duration of postoperative follow up was 24 months and no patient was lost to follow up. Clinical evaluations were performed preoperatively & post operatively using the American Orthopaedic Foot & Ankle Society (AOFAS) ankle - hind foot score and the Visual Analogue Scale (VAS) for pain. The surgical time, time to return to profession (dancing), patient satisfaction and any complications related to the surgery were assessed.

RESULTS

Average AOFAS ankle hindfoot score increased from 72.6 ± 5.1 (range 64 - 78) preoperative to 93.8 ± 3.2 (range 86-100) post-operative ($p < 0.05$) and VAS for pain decreased from 6.8 ± 1.4 (range 5-10) preoperatively to 1.8 ± 0.8 (range 0-4) ($p < 0.05$) at final evaluation. Average plantar flexion of the ankle increased from 27 ± 3.2 (range 20-35) degree to 43 ± 0.4 (range 40-45) degree ($p < 0.05$) post operatively. Mean time to resumption of activity and dancing was 6 weeks (range 4-8 weeks). On physical examination, no patients showed any signs of local tenderness, & the forced planter flexion test findings were negative except in one case in which swelling persisted. There were no major intraoperative & postoperative complications in any patients. Overall patient satisfaction was high.

CONCLUSIONS

Endoscopic excision of a symptomatic os trigonum in those patients after failure of conservative treatment for ≥6 months using posterolateral and posteromedial portals in prone position was a safe and effective technique with least complications.

KEYWORDS

Os Trigonum, Posterior Ankle Impingement Syndrome

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BACKGROUND

Posterior Ankle Impingement Syndrome (PAIS) is a clinical disorder characterized by pain in posterior ankle on performing activities involving forced planter flexion.[1,2] Professions involving regular use of such ankle movements like ballet dancers, footballers, gymnasts, jumpers more commonly experience features of PAIS.[1,3,4,5] In Odisha we have traditional folk (ballet) dancers, who walk in processions doing dancing in acute flexion of ankle. These patients suffer from posterior ankle impingement syndrome. The impingement occurs due to entrapment of a bony (e.g. os trigonum, Shepherd's fracture, Stieda's process) or soft tissue (e.g. hypertrophied or torn posterior inferior tibiofibular ligament, FHL pathologies etc.,) structure between the posterior malleolus of tibia and posterolateral aspect of talus. The posterolateral process of talus is called trigonalprocess. A groove containing the FHL tendon divides this process. If the posterolateral process remains as an ossicle separate from the talus it is called os trigonum. The os trigonum is a secondary ossification center of the talus that mineralizes between 7 to 13 years of age and fuses within 1 year forming the Stieda process. The os trigonum remains separate in 7%-14% population.[6] os trigonum is usually asymptomatic but this bone can cause persistent posterior ankle pain in those who repeatedly do full plantar flexion of the ankle and then it is termed os trigonum syndrome.[7] Initial treatment of this syndrome is conservative management. Failure of conservative management for 3 months is an indication for surgery. Open excision through a posterolateral approach has had satisfactory results but has also had a high rate of morbidity including injury to sural nerve besides having long term recovery period.[8] With the advancement of arthroscopic technique shortening of recovery time, lower complication rate and less scarring has been observed as compared to open procedure.[9,10,11,12]

The purpose of the present study was to assess the clinical and radiological results of excision of symptomatic os trigonum using an endoscopic procedure in professional ballet dancers of Odisha. Our hypothesis was that posterior endoscopic excision of the os trigonum would be safe and effective in treating PAIS related to the os trigonum.

METHODS

After approved by the Medical Ethics Committee of SCBMC & H, Cuttack for this study, informed consent was obtained from all the patients who presented to SCBMC & H with persistent posterior ankle pain due to os trigonum after failure of conservative treatment of 6 months. All patients provided written informed consent prior to participation.

Inclusion Criteria

We included all patients with PAIS due to os trigonum who were-

1. Professional ballet dancers.
2. Unsatisfactory improvement after conservative treatment for ≥6 months.
3. Absence of any previous surgical procedure on the same ankle.
4. Patients willing for surgery.

Patient Information

This prospective study included 30 ankles of 20 patients who underwent arthroscopic removal after failure of a 6 months conservative treatment of os trigonum in prone position via posterolateral and posteromedial portal by a single surgeon from May 2015 to May 2018 in SCBMC & H. In all patients the primary diagnosis was posterior ankle impingement syndrome (PAIS) due to os trigonum with painful limitation of plantarflexion. The indication for surgery was persistent posterior ankle pain despite non operative treatments for 6 months and having bony os trigonum in x-ray / MRI. 12 patients were male 8 female. 10 cases had B/L ankle involvement. All patients were ballet dancers by profession in Odisha. The mean duration of symptoms prior to operation was 8 months (range 6-10 months). The mean duration of post op follow up was 24 months (range 6-36 months) and none of the patients were lost to follow up.

Variables	Values
1. No. of patients	20
2. Total no. of ankles	30
3. B / L involvement	10
4. Male / Female	12 / 8
5. Duration of symptoms (months)	8 ± 2.2
6. Follow-up period (months)	24 ± 8.6

Table 1. Demographic Data

Pre-Operative Clinical & Radiological Assessment

On physical examination, the main signs were tenderness over the posterolateral or posteromedial aspect of the ankle joint anteriorly of the Achilles tendon and pain at maximum plantar flexion of the ankle on the hyper-plantar flexion test. Preoperative and postoperative clinical evaluation were done using AOFAS ankle hindfoot score and VAS for pain. The active plantarflexion of the ankle joint was measured using a goniometer preoperatively and at the last follow up. All ankles were radiologically evaluated preoperatively & post operatively with the help of radiographs & MRI. The surgical time, time to return to profession (dancing), patient satisfaction and any complications related to the surgery were assessed.

Operative Technique

The patients were placed in prone position with the effected foot hanging at the end of table so that full ROM can be done during surgery. A thigh tourniquet was applied. The 2 posterior endoscopic portals were adjacently located medial and lateral to the Achilles tendon and about 1.5 cm proximal to the lateral malleolus tip. After superficial skin incision were made the subcutaneous layer was split with a mosquito forceps to prepare the space for arthroscope. Then the 4 mm 30-degree arthroscope was introduced through the lateral portal in a direction pointing towards the posterior talar process while a shaver was introduced through medial portal to remove surrounding fat tissue and adhesions. Once

the FHL was visualized all manipulation should be done lateral to FHL. After debridement of all the soft tissue around os trigonum it was removed enblock with grasper in 24 ankles with slightly widening of posteromedial portal and in 6 cases it was removed by fragmentation as the size was too big. After removal of the os trigonum the FHL was examined for abnormal findings such as longitudinal tear or nodular thickening

Postoperative Protocol

After surgery, a compressive bandage was applied, and patients were not allowed Weight bearing. 3rd day post operatively onwards active dorsiflexion of the ankles were started. At 2 weeks post operatively, they were allowed to bear weight & walk with weight bearing. At 4 weeks post operatively, the patients were allowed to return to day to day activity and at 6 weeks post operatively, dancing was allowed.

Statistical Analysis

All quantitative variables are presented as the mean ± standard deviation. Comparisons between paired data such as the preoperative and postoperative VAS score, AOFAS scale score and ankle planter flexion were performed using the Student t test. The significance level was defined as $p < 0.05$. Data analysis were performed using SPSS software, version 17.0 (SPSS, Chicago, IL) & Microsoft Excel.

RESULTS

The mean age of the patients at final follow-up visit was 28.4 ± 8 years (range 18 - 44 years). The mean duration of surgery was 39.2 ± 3.8 minutes (range 30-45). Average postoperative follow-up duration was 24 ± 8.6 months (range 6 - 36 months). Average AOFAS ankle hind foot score increased from 72.6 ± 5.1 (range 64-78) preoperatively to 93.8 ± 3.2 (range 86-100) post operatively ($p < 0.05$) at final follow-up. VAS for pain decreased from 6.8 ± 1.4 (range 5-10) preoperatively to 1.8 ± 0.8 (range 0-4) post operatively ($p < 0.05$). Average plantar flexion of the ankle increased from 27 ± 3.2 (range 20-35) degree to 43 ± 0.4 (range 40-45) degree post operatively ($p < 0.05$) at final follow-up. Mean time to resumption of professional activities was 6 weeks (range 4-8 weeks). On physical examination no patients showed any signs of local tenderness & the forced planter flexion test findings were negative. No intraoperative complications were noted.

Variables	Preoperative Value	Postoperative value	p
1. AOFAS	72.6 ± 5.1	93.8 ± 3.2	p <0.05
2. VAS	6.8 ± 1.4	1.8 ± 0.8	p <0.05
3. Plantar flexion of ankle degree)	27 ± 3.2	43 ± 0.4	p <0.05

Table 2. All Statistically Significant Data

Abbreviations: AOFAS, American Orthopaedic Foot and Ankle Society; VAS, visual analog scale.
Data presented as mean ± standard deviation

Figure 1

Figure 2

Figure 3

Figure 4

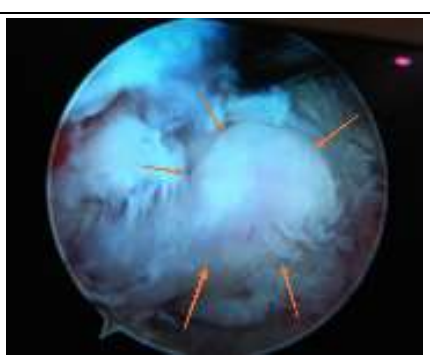

Figure 5

Figure 6

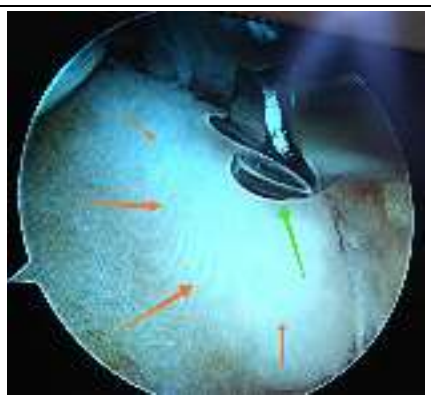

Figure 7

Figure 8

No cases of superficial or deep infection were detected. There were no significant postoperative complications except in one patient where swelling persisted due to synovitis. Overall patient satisfaction was high.

DISCUSSION

PAIS is a group of disorder, characterized by posterior ankle pain while the ankle is in hyperflexion which is more seen in ballet dancers and soccer players. These symptoms which were before undiagnosed are now diagnosed because of increased awareness and advanced imaging.

Conservative treatment methods for os trigonum causing PAIS may work for patients with limited active lifestyle, but usually for those professions needing repeated forced planter flexion like ballet dancers, gymnasts and footballers fail to respond to conservative treatment up to their satisfaction.[13,14] Operative techniques aim at removing the impinging pathology. Traditionally open techniques have been used to remove the impinging lesion. For open surgery the approach is either posteromedial or posterolateral. Ribbans et al in their review article have shown the overall nerve injury rate was 4.2% with a lower incidence for the medial approach (1.6%) compared to lateral approach (12.9%) and overall wound complication rate was 2.8%.[5] The traditional open treatment of PAIS through medial and lateral approach have high complication rates. (WG Hamilton, MJ Geppert, FM Thompson-Pain in the posterior aspect of the ankle in dancers**.** Differential diagnosis and operative treatment JBJS, 1996 journals.www.com, PubMed, Google Scholar). However the concerns are technically demanding procedure with a steep learning curve. (J. Chris Coetzee, MD, Jeffrey D. Seybold, MD, Brad R. Moser, Management of Posterior Impingement in the Ankle in Athletes and Dancers, PubMed, Google Scholar). All our patients underwent surgery after failure of a course of conservative treatment, which has only 60% success rate**.** MR Hedrick M.D., Angus Murdoch McBryde, M.D. Posterior Ankle Impingement, foot and ankle injury 1994 15: 2-8, PubMed, Google Scholar). Our patients also showed similar advances recovery rate, with early return to work and sports, and it is comparable to the finding of other authors.[8,9,10] where the average AAFOS Score increases from 72.6 to 93.8 and VAS Score decreased from 6.8 to 1.8.

However the limitations of the study was being it is a single surgeon, single institution based study with a limited follow up period.

CONCLUSIONS

Recent advances in minimally invasive procedures have allowed the use of endoscopic technique to give equal functional results with better cosmesis, addressing the pathology, and early return to work, for patients with physically demanding life style.[9] So, looking at the result we can conclude that endoscopic os trigonum removal is one of the best option of PAIS management when it is due to impingement by bony projection.

REFERENCES

[1] Rogers J, Dijkstra P, Mccourt P, et al. Posterior ankle impingement syndrome: a clinical review with reference to horizantal jump athelets. Acta Orthop Belg 2010;76(5):572-579.
[2] Maquirriain J. Posterior ankle impingement syndrome. Am J Acad Orthop Surg 2005;13(6):365-371.
[3] Bureau NJ, Cardinal E, Hobden R, et al. Posterior ankle impingement syndrome: MR imaging findings in seven patients. Radiology 2000;215(2):497-503.
[4] Robinson P, White LM. Soft tissue and osseous impingement syndromes of the ankle: role of imaging in diagnosis and management. Radiographics 2002;22(6):1457-1469.
[5] Ribbans WJ, Ribbans HA, Cruickshank JA, et al. The management of posterior ankle impingement syndrome in sport: a review. Foot Ankle Surg 2015;21(1):1-10.
[6] McDougall A. The os trigonum. J Bone Joint Surg Br 1995;37(2):257-265.
[7] Blake RL, Lallas RJ, Ferguson H. The os trigonum syndrome. A literature review. J Am Podiatr Med Assoc 1992;82(3):154-161.
[8] Jerosch J, Fadel M. Endoscopic resection of a symptomatic os trigonum. Knee Surg Sports Traumatol Arthosc 2006;14(11):1188-1193.
[9] Guo QW, Hu YL, Jiao C, et al. Open versus endoscopic excision of a symptomatic os trigonum: a comparative study of 41 cases. Arthoscopy 2010;26(3):384-390.

[10] Horibe S, Kita K, Natsu-ume T, et al. A novel technique of arthoscopic excision of a symptomatic os trigonum. Arthoscopy 2008;24(1):121.e1-4.
[11] Scholten PE, Sierevelt IN, van Dijk CN. Hindfoot endsocopy for posterior ankle impingement. J Bone Joint Surg Am 2008;90(12):2665-2672.
[12] Williams MM, Ferkel RD. Subtalar arthroscopy: indications, technique, and results. Arthroscopy 1998;14(4):373-381.
[13] Messiou C, Robinson P, O'Connor PJ, et al. Subacute posteromedial impingement of the ankle in athelets: MR imaging evaluation and ultrasound guided therapy. Skeletal Radiol 2006;35(2):88-94.
[14] Robinson P, Bollen SR. Posterior ankle impingement in professional soccer players: effectiveness of sonographically guided therapy. AJR Am J Roentgenol 2006;187(1):53-58.