The Results of Ankle Arthrodesis with Screws for End Stage Ankle Arthrosis

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Aim of this study was to evaluate the results of ankle arthrodesis with screws in patients with ankle arthrosis. The author studied 19 patients (20 feet) who had been treated by ankle arthrodesis with screws from 2003 to 2008. Ten patients were men (11 feet) and nine (9 feet) were women. Their mean age was 56 years (30 to 65), and the average duration of follow-up was four years (2 to 6). Two compression screws were used in all feet. Union was achieved in 19 of the 20 feet (95%). Average scores for pain and clinical condition are increase after operation. One re-operation was performed for nonunion. Author conclude that ankle arthrodesis with screws was effective treatment for ankle arthrosis.

***Keyword**: Ankle, Arthodesis, Arthrosis, Open, Screws*

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Ankle arthrosis is one of the common problems for which patients present to the orthopedic surgeon. The treatment of ankle arthrosis includes nonsurgical and surgical options. Nonsurgical treatment of ankle arthrosis may include limitation and modification of activities, nonsteroidal anti-inflammatory drugs, a cane or crutches. Surgical treatment options include arthroscopic debridement[1], excision of impinging osteophytes[2] and arthrodesis[3-8]. Results of debridement for advanced arthrosis may be limited. Total ankle replacement for the treatment of ankle arthrosis has been associated with complications and failures including early loosening, subsidence, malalignment of the components, soft tissue imbalance, infection, and dislocation[7-12]. Despite recent renewed interest in total ankle arthro plasty[13-15], ankle arthrodesis remains the primary surgical treatment option for disabling ankle arthrosis in most patients. It enables the surgeon to create a painless plantigrade and stable foot in patients with advanced and disabling ankle arthrosis. In the published reports of ankle arthrodesis in adults, the operation was considered successful in 70% to 100% of patients[16,18]. Many different surgical approaches, resection methods, and fixation techniques have been described for ankle arthrodesis. The purpose of this study was to evaluate the results of ankle arthrodesis with screws in patients with ankle arthrosis.

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Material and Method

The author retrospectively reviewed the records of all patients with ankle arthrosis who had been treated by ankle arthrodesis with screws between 2003 and 2008. There were nine women and ten men with a mean age of 56 years (range 30-65 years). Nine patients had post-traumatic ankle arthritis, three had rheumatoid arthritis and seven had secondary osteoarthritis from gout. Patients had severe pain, functional impairment, limited joint mobility and had radiographic features of arthritis (Fig. 1,2).

All patients had pain which had not been adequately relieved by conservative management, including orthotics, walking aids, non-steroidal anti-inflammatory drugs and corticosteroid injection. Before operation they all had had moderate or severe limitation of daily activities.

Operative technique

The patient was placed in a supine position on a radilucent operation table and the leg was draped

to enable fluoroscopic control during surgery. After skin incision interval between extensor hallucis longus and extensor digitorum longus tendon was retract to approach to ankle joint. Removal of the remnants of articular cartilage and abrasion of the underlying bone surfaces using a small curette and osteotome. The ankle was brought into the fusion position (neutral position, 5° valgus and 10°-15° external rotation) and fix with two 4.5 mm cortical screws. One screw was inserted from medial malleolus to talus. The other was inserted from lateral side of tibia. Position confirmed radiologically in both planes. Post-operatively, a Robert Jones compression dressing with plaster splints was applied, followed by a non-weight-bearing below-knee cast until there was radiological evidence of union (Fig. 3,4).

Evaluation

Pain, clinical status, ankle joint mobility and radiograph were evaluated before and after treatment. Pain was measured with the use of a visual analog scale on which patients were asked to score their pain between 0 and 10 (with 10 being the worst). The clinical condition of the patients was measured by assessment of two features (maximum score 4) (Table 1). The range of sagittal movement from maximal dorsi-flexion to plantar flexion (Fig. 5, 6) was measured.

Union at the arthrodesis site was assessed.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

The results were expressed as means and standard deviations. Significant differences were determined by a paired two-tailed t-test with $p < 0.05$ taken as the level of significance.

Results

The mean follow-up was four years (2 to 6). One patient required a revision operation and was recorded as a failure. Average scores for pain, clinical condition, and foot mobility are shown in Table 2. The average score for pain decreased by 85% ($p < 0.05$), the average score for clinical condition decreased by 78% ($p < 0.05$), and joint mobility decreased by 85% ($p < 0.05$).

Radiological union was achieved in 19 of the 20 feet (95%). Union was observed by obliteration of the joint space and continuous trabecular markings on the plain radiographs. The mean time to union was 4

Fig. 5

Fig. 6

Table 1. Clinical evaluation of the patients

Parameter, feature assessed/question asked of patient	scores
Clinical condition*	
Discomfort during daily activity	0-2
Swelling of the foot and ankle	0-2
Mobility Foot motion	Range of motion
Pain, Judge the severity of the pain in the treated ankle, using a scale of 0-10, where 0 no pain and 10 pain as bad as it could be.	0-10

*Clinical condition answers were rated as follows: none = 0, moderate/sometimes =1, and obvious/yes = 2

Table 2. Result after ankle fusion

	Pre-op	Post-op	p-value
Pain	7.2 $\pm$ 1.4	1.2 $\pm$ 1.0	< 0.05
Clinical condition	2.1 $\pm$ 1.2	0.6 $\pm$ 0.4	< 0.05
Foot motion			
Dorsiflexion	10 $\pm$ 3	0 $\pm$ 2	< 0.05
Plantarflexion	29 $\pm$ 6	4 $\pm$ 3	< 0.05

months (range, 3-10 months).

Complications and re-operation

There were no postoperative infections or nerve injuries. One foot had delayed wound healing, which was treated successfully by local wound care. A revision arthrodesis for nonunion was performed in one foot using supplementary iliac-crest bone grafting. Union was achieved with a satisfactory clinical result.

Discussion

Ankle arthrodesis is a reliable procedure for the treatment of arthrosis of the ankle[16]. Arthrodesis with screws provides stability, a greater bony surface for fusion leading to higher fusion rates and a more functional outcome[17]. In this series 95% of the ankles achieved union after the index procedure. These results compare favorably with the results of other studies utilizing arthrodesis with screws including rates of 100% reported by Paremain et al and Maurer et al[16,18]. The average time to union in this series was 16 weeks. This falls within the range of times encountered in the literature, from 6 weeks as reported by Paremain et al to 16 weeks as noted by Holt et al[16,17]. Finally, the greatest dissatisfaction and concern regarding the use of ankle fusion is the risk of developing progressive arthrosis of the subtalar and midfoot joints. None of the patients in this series have developed progressive arthrosis because of short to intermediate follow-up period. Total ankle arthroplasty has shown disappointing results in the past and newer designs have limited follow-up[10,12,13,14]. Thus, I feel that while motion-sparing alternatives to arthrodesis must continue to be pursued, the results of these procedures must equal or surpass the high satisfaction rate of patients with an ankle arthrodesis before arthroplasty can be recommended. With respect to study design (retrospective study), future investigations with larger sample sizes and plan longer follow-up periods would be helpful in determining if the high rate of fusion and the low rate of complications observed in this investigation would bear out.

References

1. Scranton PE Jr. An overview of ankle arthrodesis. Clin Orthop Relat Res 1991; 96-101.
2. Katcherian DA. Treatment of ankle arthrosis. Clin Orthop Relat Res 1998; 48-57.
3. Thermann H, Huefner T, Schratt HE, Von Glinski S, Roehler A, Tscherne H. Screw fixation for ankle arthrodeses. Foot Ankle Surg 1999; 5: 131-42.
4. Perlman MH, Thordarson DB. Ankle fusion in a high risk population: an assessment of nonunion risk factors. Foot Ankle Int 1999; 20: 491-6.
5. Turan I, Wredmark T, Fellander-Tsai L. Arthroscopic ankle arthrodesis in rheumatoid arthritis. Clin Orthop Relat Res 1995; (320): 110-4.
6. Miehlke W, Gschwend N, Rippstein P, Simmen BR. Compression arthrodesis of the rheumatoid ankle and hindfoot. Clin Orthop Relat Res 1997; (340): 75-86.
7. Corso SJ, Zimmer TJ. Technique and clinical evaluation of arthroscopic ankle arthrodesis. Arthroscopy 1995; 11: 585-90.
8. Chen YJ, Huang TJ, Shih HN, Hsu KY, Hsu RW. Ankle arthrodesis with cross screw fixation. Good results in 36/40 cases followed 3-7 years. Acta Orthop Scand 1996; 67: 473-8.
9. Stauffer RN. Salvage of painful total ankle arthroplasty. Clin Orthop Relat Res 1982; (170): 184-8.
10. Newton SE 3rd. Total ankle arthroplasty. Clinical study of fifty cases. J Bone Joint Surg Am 1982; 64: 104-11.
11. Groth HE, Fitch HF. Salvage procedures for complications of total ankle arthroplasty. Clin Orthop Relat Res 1987; (224): 244-50.
12. Bolton-Maggs BG, Sudlow RA, Freeman MA. Total ankle arthroplasty. A long-term review of the London Hospital experience. J Bone Joint Surg Br 1985; 67: 785-90.
13. Kofoed H, Sorensen TS. Ankle arthroplasty for rheumatoid arthritis and osteoarthritis: prospective long-term study of cemented replacements. J Bone Joint Surg Br 1998; 80: 328-32.
14. Kofoed H, Lundberg-Jensen A. Ankle arthroplasty in patients younger and older than 50 years: a prospective series with long-term follow-up. Foot Ankle Int 1999; 20: 501-6.
15. Hintermann B. Short- and mid-term results with the STAR total ankle prosthesis. Orthopade 1999; 28: 792-803.
16. Paremain GD, Miller SD, Myerson MS. Ankle arthrodesis: results after the miniarthrotomy technique. Foot Ankle Int 1996; 17: 247-52.
17. Holt ES, Hansen ST, Mayo KA, Sangeorzan BJ. Ankle arthrodesis using internal screw fixation. Clin Orthop Relat Res 1991; (268): 21-8.
18. Maurer RC, Cimino WR, Cox CV, Satow GK. Transarticular cross-screw fixation. A technique of ankle arthrodesis. Clin Orthop Relat Res 1991; (268): 56-64.

ผลการรักษาข้อเท้าเสื่อมโดยการเชื่อมข้อเท้าด้วยตะปูเกลียวในผู้ป่วยข้อเท้าเสื่อมระยะสุดท้าย

ยิ่งยง ต่ออุดม

วัตถุประสงค์: *รายงานผลการรักษาข้อเท้าเสื่อมโดยการเชื่อมข้อเท้าด้วยตะปูเกลียว*

วัสดุและวิธีการ: *ศึกษาข้อมูลของผู้ป่วยข้อเท้าเสื่อมที่ได้รับการรักษาโดยการเชื่อมข้อเท้าด้วยตะปูเกลียวในศูนย์การแพทย์สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี ตั้งแต่ปี พ.ศ. 2546 ถึงปี พ.ศ. 2551 รวมระยะเวลา 6 ปี ประเมินผลการเชื่อมของข้อเท้า การกระดกเท้าขึ้นและลง การใช้งานในชีวิตประจำวันและภาวะแทรกซ้อนภายหลังผ่าตัด*

ผลการศึกษา: *ผู้ป่วยทั้งหมด 19 ราย ข้อเท้า 20 ข้าง ผู้ป่วย 18 ราย มีการเชื่อมของข้อเท้า ผู้ป่วย 1 ราย มีปัญหาข้อเท้าไม่เชื่อมและได้รับการผ่าตัดซ้ำ*

สรุป: *การเชื่อมข้อเท้าโดยวิธีใช้ตะปูเกลียวได้ผลการรักษาอยู่ในเกณฑ์ดี โดยข้อเท้าสามารถเชื่อมได้ 95% และยังสามารถกระดกเท้าขึ้นและลงได้ 4 $\pm$ 3 องศา จากการขยับของข้อ calcaneocuboid talonavicular และผู้ป่วยสามารถกลับไปใช้ชีวิตประจำวันได้ตามปกติ ผู้ป่วยทุกรายอาการปวดลดลงเป็นที่น่าพอใจ ไม่มีผู้ป่วยรายใดมีการติดเชื้อหรือเส้นประสาทได้รับบาดเจ็บภายหลังผ่าตัด*