



# Tibio Crural Arthrodesis: Evaluation of Results at Omar Bongo Ondimba Military Teaching Hospital: About 23 Cases

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## Abstract

Arthroplasty and arthrodesis are currently the most frequently used surgical options for the management of tibiofibular osteoarthritis.

The aim of this study was to evaluate the outcome of tibiofibular arthrodesis in the orthopedic surgery department of the Omar Bongo Ondimba Military Teaching Hospital (OBOMTH).

Materials and methods: This was a retrospective, descriptive, single-center study. It took place in the orthopedic surgery department of OBOMTH from January 2020 to December 2023.

The study included all patients who underwent surgery for tibiofibular osteoarthritis and whose records were complete and usable. The method of fixation for the arthrodesis depended on the availability of the hardware. Outcomes were evaluated using the AOFAS (American Orthopaedic Foot and Ankle Society) score.

Results: The study population consisted of 18 men and 5 women, for a ratio of 3.6. The median age was 68.7 years.

The arthrodesis was fixed either with two 6.5 mm diameter partially threaded screws, under fluoroscopic guidance for a cross or parallel arrangement (n=16; 69.6%); or with a reshaped and contoured anterior tibiotalar plate (n=7; 30.4%). The results were very satisfactory (56.5%), satisfactory (30.4%) and poor (13.1%).

Conclusion: Despite the instability of screw fixation, the results are generally satisfactory if best practices during and after surgery are followed for both types of open procedure.

**Keywords:** Osteoarthritis; Arthrodesis; Screw Fixation; Plate Fixation

## Introduction

The functional impact of tibiofibular osteoarthritis affects quality of life [1]. Arthroplasty and arthrodesis are currently the most commonly used surgical options for the management of tibio crural osteoarthritis [2]. The literature has reported several arthrodesis techniques [2,3].

In Gabon, few studies have been conducted on the surgical management of tibio crural osteoarthritis. The aim of this study was to evaluate the outcome of tibiofibular arthrodesis in the orthopedic surgery department of the Omar Bongo Ondimba Military Teaching Hospital (OBOMTH).

## Materials and Methods

This was a retrospective, descriptive, single-center study. It was conducted in the orthopedic surgery department of OBOMTH from January 2020 to December 2023. The study population consisted of patients who underwent tibio crural arthrodesis. The variables studied were socio-demographic characteristics (age, sex, occupation), clinical examination data (pain, functional

impact, alignment, medical imaging), comorbidities, etiological profile, method of arthrodesis fixation and postoperative course. The study included all patients who underwent surgery for tibiofibular osteoarthritis and whose records were complete and usable. Records not included were incomplete, unusable or patients lost to follow-up. The method of arthrodesis fixation depended on the availability of materials. Outcome evaluation was performed using the AOFAS (American Orthopaedic Foot and Ankle Society) score [2].

The data collection tool consisted of data collection forms. Information was gathered through direct review of the records. The collected data was entered and analyzed using Microsoft Excel, Microsoft Word and Sphinx Plus software. The study was conducted in accordance with good research practices, respecting the confidentiality of the collected data.

## Results

During the study period, the Orthopedic and Trauma Surgery Department at OBOMTH admitted 1458 patients. Of these, 23 patients underwent tibiofibular arthrodesis, representing an incidence of 1.9%. The study population consisted of 18 men and 5 women, for a ratio of 3.6. The involvement was unilateral in all patients, predominantly affecting the right side ( $n = 17$ ). The median age was 68.7 years. Comorbidities were found in 6 patients (26%). These were overweight with a BMI greater than 30 kg/m<sup>2</sup> ( $n=4$ ), diabetes ( $n=1$ ) and active smoking ( $n=1$ ). The dominant occupations were foresters ( $n=14$ ), farm workers ( $n=7$ ) and those without fixed employment ( $n=2$ ).

Clinical signs were dominated by debilitating pain and functional limitations in everyday activities. Paraclinical signs were radiographic: tibiofibular osteoarthritis with intra-articular deformity of less than 10°. The etiologies were predominantly post-fracture osteoarthritis ( $n=19$ ; 82.6%). The others were considered idiopathic osteoarthritis.

The arthrodesis was fixed using two 6.5 mm diameter partially threaded screws, under fluoroscopic guidance, for either a cross or parallel arrangement, as illustrated in Fig. 1,2 ( $n = 16$ ; 69.6%). A reshaped and contoured anterior tibiotalar plate was used in 7 patients (30.4%), as shown in Fig. 3. Postoperative management consisted of plaster cast immobilization to secure the fixation and non-weight-bearing of the limb for 45 days. Weight-bearing was then gradually reduced. Initially, 25% of body weight was used, then increased by 15 to 20% per week. Clinical and radiological monitoring was performed initially at 4, 8 and 12 weeks post-operatively, then every 3 months until 1 year after surgery, then every 6 months until 30 months after surgery and thereafter at the patient's request.

The mean follow-up was 21 months. No patients were lost to follow-up. The outcome was marked, on the one hand, by 2 cases (obese) of pseudarthrosis on parallel screw fixation, due to absence of unitary callus formation and persistent weight-bearing pain beyond 6 months post-operatively and on the other hand, by 1 case (diabetic) of skin necrosis on a screwed plate. Surgical revision with plate and graft was indicated for nonunions and negative pressure wound therapy for necrosis. Evaluation was performed using the AOFAS score and the Visual Analog Scale (VAS), as well as the patient's level of satisfaction. Results were very satisfactory ( $n=13$ ; 56.5%), satisfactory ( $n=7$ ; 30.4%) and poor ( $n=3$ ; 13.1%).



**Figure 1:** Cross screwing.



**Figure 2:** Parallel screwing.



**Figure 3:** Re-adjusted anterior plate.

### Discussion

Tibio crural osteoarthritis is a debilitating condition that impacts quality of life [1]. Its surgical management remains controversial between proponents of arthrodesis and those of arthroplasty [4,5]. However, numerous publications have demonstrated the effectiveness of both procedures in relieving pain, despite their biomechanical differences [2,4,5].

The limitations of our study were, firstly, the small sample size and secondly, its primary focus on evaluating the outcomes of spinal fusion. The study reported a male predominance and a mean age of 68.7 years. The dominant occupations were forestry and agricultural workers. The right side was more frequently affected.

Several authors have reported series of 42 to 50 predominantly male cases, aged 42 to 78 years, with the affected side being mostly the right [2,3]. This could be explained by the fact that men are often more active in professions with high daily stress on the ankles and by the universal right-sided dominance [6].

The comorbidities in the study were, respectively, overweight (BMI greater than 10 kg/m<sup>2</sup>), diabetes and smoking. The literature has reported obesity as an aggravating factor in tibiofibular osteoarthritis by degrading the quality of the metaphyseal trabecular bone with a negative impact on screw fixation [3,7-10]. The predominant etiology in the study was post-fracture osteoarthritis (82.6%). Nazim Mehdi, et al., found this dominance in 70% in a series of 50 patients, unlike Claire Nicot, et al., who reported primary osteoarthritis as the dominant etiology in 49% in a series of 42 patients [2,3]. Post-fracture osteoarthritis in our series was the long-term complication of complex ankle trauma. All patients presented with an intra-articular deformity of less than 10°. Beyond 10°, the risk of nonunion is high. Hence the need for open surgery with a dedicated plate for extensive release [7,11,12].

Several arthrodesis techniques differ in their approach or method of fixation [7-9]. In this study, arthrodesis was performed via open reduction and internal fixation. The fixation methods were, on the one hand, cross or parallel screw fixation (69.6%) and on the other hand, anterior screw-retained plates (30.4%). Townshend D, et al., reported the arthroscopic approach as ideal due to the preservation of vascularization, resulting in the best joint fusion rates but it only allows for screw fixation [3,13]. Other authors have reported excellent joint fusion rates with the screw-retained plate reinforced by certain techniques such as fibular subtraction osteotomy, which allows compression of the arthrodesis site [10,11,14,15].

Complications observed in our series have also been reported by some authors who agree on the need for surgical revision [2,3,7,12]. This procedure carries a high risk of devascularization, which can compromise bone healing [7,8,12]. Results according to the AOFAS score were very satisfactory (56.5%), satisfactory (30.4%), poor (13.1%), comparable to those reported in other series [2,8,12,14].

### **Conclusion**

Open tibiofibular arthrodesis remains a common procedure in our setting. Despite the instability of screw fixation, the results are generally satisfactory if best practices are followed during and after surgery. An anterior screw-retained plate, despite the risk of devascularization, remains the preferred option in cases of overweight.

### **Conflict of Interest**

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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### **Data Availability Statement**

Not applicable.

### **Ethical Statement**

The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore, was exempt.

### **Informed Consent Statement**

Informed consent was taken for this study.

### **Authors' Contributions**

All authors contributed equally to this paper.

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