

Freiberg's Disease: Retrospective Study of 14 Cases

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DOI: [10.36347/sjams.2019.v07i08.045](https://doi.org/10.36347/sjams.2019.v07i08.045)

| Received: 15.08.2019 | Accepted: 26.08.2019 | Published: 30.08.2019

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Abstract

Original Research Article

Freiberg's disease, or Kohler's second disease, is an aseptic osteonecrosis that essentially affects the head of the 2nd metatarsal and may progress to instability of the anterior arch of the foot. Our series includes 14 cases of Freiberg's disease whose diagnosis of certainty was made by standard radiography. According to Smillie's classification, stage III is found in 7 cases, stage IV in 5 cases; stage II in one and stage V in one. Surgical treatment is performed after failure of medical treatment. The 14 operated patients of our series all benefited from an osteotomy of the metatarsal neck by resection of a dorsal bone wedge according to the technique described by Gauthier. With an average follow-up of 12 months, both clinically and radiologically, our results were consistently satisfactory.

Keywords: Freiberg's disease, Osteotomy of Gauthier, Osteochondrosis, Metatarsus.

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INTRODUCTION

Freiberg's disease is a known foot disease since 1914, it falls within the framework of metatarsalgia, frequent reason for consultation. Her physiopathology is still open to discussion, two major groups of theories oppose: vascular and traumatic. Osteonecrosis essentially affects the head of the 2nd metatarsal, this metatarsal is the longest, the most rigid and the least mobile because of its embedding between two cuneiforms and two metatarsals. Our study is a retrospective study aimed at analyzing the epidemiological, clinical radiological and therapeutic data of Freiberg's disease.

METHODS

We collected a series of 14 patients with Freiberg's disease treated by Gauthier's osteotomy over a 10-year period from 2007 to 2017 with a follow-up of 12 months. The objectives of this study: the analysis of epidemiological, clinical and radiological data of Freiberg's disease and also the evaluation of the postoperative results of Gauthier's osteotomy.

RESULT

The average age of our patients was 21 years old with extremes ranging from 17 to 45 years, with a female predominance (11 women and 3 men). The right foot was found in 8 cases and the left foot in 6 cases. In

our series we noted: 3 Greek feet 8 Egyptian feet 3 square feet. The 2nd metatarsal involvement was found in 11 patients and the third was found in 3 patients. The pain was the main reason for consultation, it was found in all the patients of the mechanical type accentuating the effort and yielding to rest. On clinical examination, palpation of the metatarsophalangeal joint of the affected foot was noted in all patients. A swelling opposite the metatarsophalangeal joint was found in 9 patients.

All our patients received a standard x-ray of the foot, which made it possible to both diagnose and classify metatarsal involvement according to the Smillie staging (Figure-1); one case was in stage 2, seven cases in stage 3 cases, and five in stage 4 and 1 case in stage 5. The treatment consisted of a dorsal flexion osteotomy of Gauthier. This is a wedge resection and the metatarsal head is tilted towards the dorsal surface followed by fixation by two pins, staple or strapping (Figure-2). The AOFAS score used for the preoperative clinical evaluation was good in 57% of cases (8 patients) and average in 43% of cases (6 patients). With a mean follow-up ranging from 12 months, postoperative clinical evaluation; based on the same score; objectified 100% good and excellent results (Figure-3). There were no complications in our series in postoperative follow-up.



Fig-1: (A) on the initial assessment, the x-ray was normal (B) a year later, the flattening of the metatarsal head is easily apparent



Fig-2: A: Preoperative picture of Freiberg's disease of the 3rd metatarsal B: intraoperative image showing osteonecrosis of the second metatarsal C: control radiography after Gauthier's osteotomy

Fig-3: The AOFAS score in pre and postoperative patients operated by Gauthier's osteotomy in our series

<i>Patients</i>	<i>Smillie Classification</i>	<i>Preoperative AOFAS score</i>	<i>Postoperative AOFAS score</i>
1	STAGE 2	79	90
2	STAGE 3	75	90
3	STAGE 3	75	85
4	STAGE 3	75	80
5	STAGE 3	70	85
6	STAGE 3	72	90
7	STAGE 3	71	86
8	STAGE 3	65	85
9	STAGE 4	59	80
10	STAGE 4	59	85
11	STAGE 4	58	71
12	STAGE 4	57	77
13	STAGE 4	52	75
14	STAGE 5	52	75

DISCUSSION

Since Freiberg's disease is relatively rare, the series of dorsal flexion osteotomies presented in the literature, except that of Gauthier and Elbaz (53 feet) [1], rarely exceed 15 cases each. In this study, the surgical treatment of Freiberg's disease by Gauthier's osteotomy allowed restitution of joint space with recovery of the sphericity of the metatarsal head without any case of nonunion for all patients in the

study. This simple technique can restore an epiphysis covered with healthy cartilage without the need for osteocartilaginous supply [2, 3]. In addition, this osteotomy makes it possible to restore a congruent and painless joint by removing the cartilaginous necrosis that causes joint inflammation. With good and very good results the clinical results are satisfactory with low morbidity. The review of the literature has shown that the dorsal flexion osteotomy provides good results with percentages good and very good results ranging from 84

to 100%. This series is therefore in line with the series of the literature. The limitation of the mobility of the metatarsophalangeal joint inherent in the surgical technique which proves to be a little inconvenient for our patients is reported in some series of the literature presenting values comparable to those of our series. With regard to the discomfort caused by the staples, some authors have limited this risk by using absorbable material or less bulky material such as small screws used in Weil osteotomies that seem less suitable for proper holding on some reworked epiphyses [4]. In addition, the discomfort caused by the staples is not found postoperatively immediate and thus seems more due to a secondary migration of these.

Gauthier's osteotomy is the leading conservative surgical treatment for Freiberg's disease [5]. This osteotomy is intended for cases of failure of medical treatment in cases of partial articular necrosis. Other techniques have been described for this type of indication such as joint debridement associated with micro-perforations (intervention of Smilie) which in addition to cleaning attempts to create fibrocartilaginous healing tissue [6]. Similarly autologous cartilage transplant is an experimental technique that seems to give good results in the short term with an improvement in the AOFAS score at 1 year in advanced stages but requiring longer term evaluations. In case of very limited necrosis with osteophytosis only hindering the footwear a simple joint cleaning has been described. In cases of total or subtotal necrosis, different techniques have been proposed. Resection of the metatarsal head frequently leads to hallux valgus and metatarsalgia by charge transfer [7, 8]. Shortening osteotomy, which in the literature found more than 80% of good and very good results, does not act directly on the joint space and preserves the necrotic cartilage, the improvement of the symptomatology being potentially due to the transfer of the load and the simple joint decompression. Prosthetic arthroplasty seems to be reserved for Stage 5 of Smilie, as well as autoplasty by tendon interposition by direct or arthroscopic approach which is an alternative to prosthetic replacement in the advanced stages of the disease [9]. A comparison of the different techniques suggests that Gauthier's osteotomy remains indicated in the advanced stages of the disease. The importance of this necrosis is not easily seen on standard radiographs. A preoperative CT scan can be used to more accurately assess the extent of this necrosis, while keeping in mind that only intraoperative macroscopic examination will make the best surgical decision [10]. In case of very extensive epiphyseal necrosis, it is necessary to have a varied therapeutic arsenal including metatarsophalangeal prostheses alternatives to the capital resections.

CONCLUSION

Freiberg's disease is a rare disease; the diagnosis is based on a thorough physical and radiographic examination. Bone scintigraphy and MRI can diagnose infra-radiological stage. The Gauthier technique is the reference because it allows obtaining satisfactory clinical and radiological results.

Conflicts of Interest

The authors do not declare any conflict of interest.

Contributions of the Authors

All authors have read and approved the final version of the manuscript.

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