



## **POSTRAUMATIC TIBIOFIBULA SYNOSTOSIS OF THE DISTAL 1/3 OF THE LEG: A CASE STUDY**

**\* Anas, IY., Esomonu, UG., Dimitrov, ND., Rabi, IF., Saleh, MS.**

Dept. of Anatomy, Faculty of Medicine, Bayero University Kano, Nigeria.

\*Correspondence author: [suhhis@yahoo.com](mailto:suhhis@yahoo.com)

### **ABSTRACT**

**Following the completion of the dissections of our cadaver we detached both the dissected lower limbs from the hip, and disjoint each by the knee and the ankle joints for maceration and preparation of bone specimens. After clearing the soft tissues of the limbs we observed that on the left lower limb there was tibiofibula synostosis (an accidental finding) following fracture of the distal 1/3 of both tibia and fibula. The history of the individual was not available, thus it is not possible to comment on the symptoms experienced by the individual when alive but we assume that the fractures of the tibia and fibula and a severe hematoma around the interosseous membrane are the possible pathogenesis of the distal tibiofibula synostosis seen in the cadaver. The calcification of the hematoma resulted in bony fusion of tibia and fibula and thus may prevent normal ankle function which might lead to ankle pain. Its presence on living individual should alert the surgeon to look for various abnormalities that are usually associated with it.**

**Key words: Tibiofibula, Synostosis, Distal 1/3 of the leg, Case study.**

### **INTRODUCTION**

Synostosis between two parallel bones such as radius and ulna or tibia and fibula are not uncommon (Frick *et al.*, 2001). It forms as a result of severe hematoma in the vicinity of the broken bones, which extends over the interosseous membrane forming a bridge for the calcification to occur. Injury to the surrounding soft tissues, haemorrhage or subperiosteal dissection across the interosseous membrane could also result to new-bone formation that results to synostosis (Frick *et al.*, 2001). Tibiofibula synostosis is known to occur following tibia fracture, nailing or osteotomy [Frick *et al.*, (2001), Munjal (2004), and Schmittenebecher *et al.*, (2000)]. Albers *et al.*, (1996), Harborne and Lennox (1989), also reported distal tibiofibula synostosis to be uniquely post-traumatic.

Jiang-Hue *et al.*, (2003) reported a case of a 21 year old male who developed synostosis of the distal 1/3 of tibia and fibula due to inversion-internal rotation injury of the ankle. This synostosis was diagnosed four years after the injury but within that period he suffered chronic ankle pain which was relieved when the synostosis was surgically removed.

McMaster and Scranton *et al.*, (1975) reported 10 cases who had distal tibiofibula synostosis which after undergoing surgical treatment their symptoms were relieved.

### **MATERIALS AND METHODS:**

The materials used in this study for the purpose of bone preparation and maceration include:

Two detached lower limbs (from a cadaver), Water, Potassium chloride, Benzene, Hydrogen peroxide, Embalming chemicals, Dissecting instruments, Autoclaving machine and Scalpel.

The two lower limbs were dissected (using the dissecting instruments) according to the standard

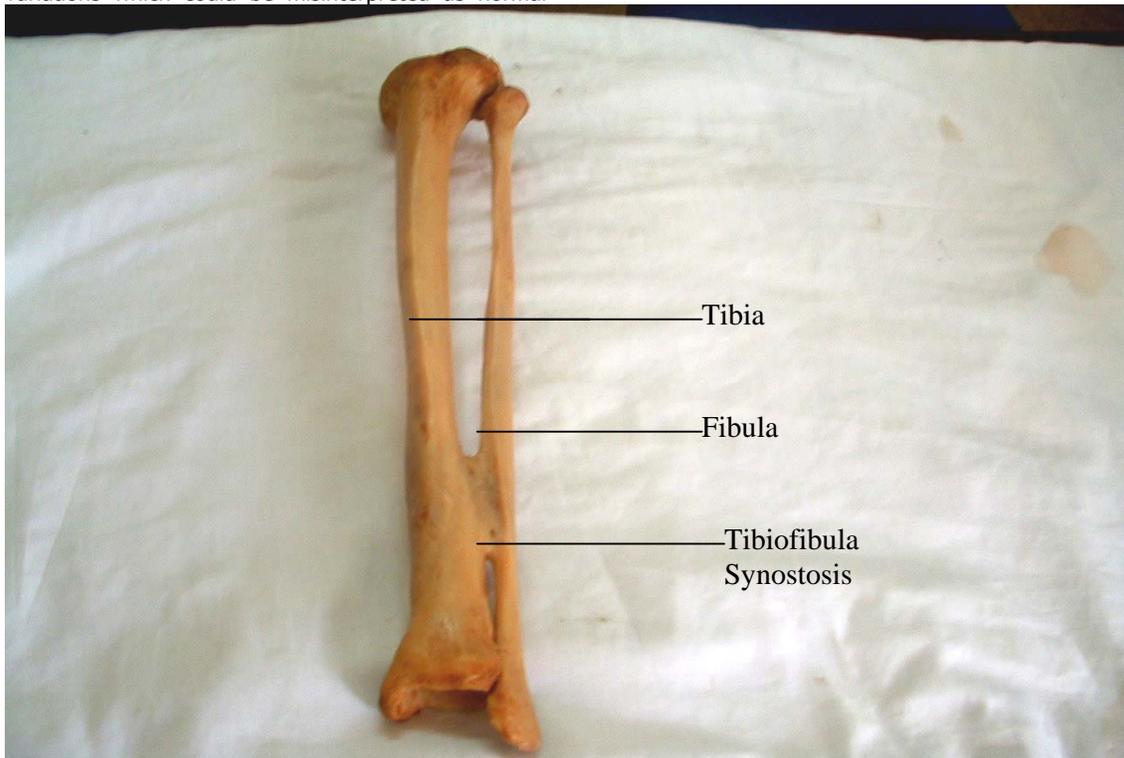
dissection technique described in the Cunningham's manual of practical anatomy by Romanes (2006). The dissected limbs were disarticulated (for the purpose of maceration) from the hip, the knee and the ankle joints and the parts were placed in the autoclaving machine and simmered (at 65°C) for four days as described by Tompsett (1970). After completion of the maceration, the various units of the limbs' skeleton were placed in a bowl containing cold water and their ends drilled to allow the marrow to escape. Each of the bone was brushed with a stiff brush and then washed thoroughly with clean water. The bones were then placed in a bowl containing diluted hydrogen peroxide plus ammonia and kept for 72hrs to allow bleaching to occur as described by Tompsett (1970). They were then exposed to hot sun shine to dry. The bones (after drying) were then treated with benzene to remove the oil (from the marrow) on the bones.

### **RESULTS**

The left tibia and fibula were found to be joined together by a bridge of bone (of about 6cm length) at the distal 1/3 after the flesh was cut during dissection and more clearly seen after the maceration process. This was the result of excess callus formation of some old fractures of both the tibia and fibula and a bony bridge involving the distal segment of the interosseous membrane. There was a gap (before the maceration) between the lower end of the interosseous membrane and the distal tibiofibula syndesmosis (Figure 1). The X-ray of the distal 1/3 of both tibia and fibula showed radiopacity of about 6cm length between the two bones without continuity of their medullary cavity (Figure 2). The diagnosis of synostosis was made.

This is an accidental finding that can occasionally be seen during the maceration of various bones at times we come across some pathological variations which could be misinterpreted as normal

anatomical structure and some anatomical peculiarities which may be considered as pathological changes.



**Plate1: Anterior view of the left tibia and fibula showing a distal 1/3 tibiofibula synostosis.**



**Plate 2: Posterior-Anterior radiograph of the left tibia and fibula showing distal 1/3 tibiofibula synostosis.**

## **DISCUSSION**

Tibiofibula synostosis could occur as a congenital defect and is accompanied by one or more deformity, such as distal positioning of the proximal tibiofibula joint, leg length discrepancy, bowing of the fibula, or valgus deformity of the knee (O'Dwyer 1991). The absence of all of these anomalies in our case, along with the presence of excessive callus formation of the distal third of the tibia, supports a post-traumatic etiology, and suggests that the synostosis occurred as a result of fracture of the distal third of the tibia. Moreover most distal variety of tibiofibula synostosis is mostly acquired, and almost uniquely reported to be a post-traumatic injury [Gamble (1984); McMaster and Scranton (1975)]. Our case is an accidental finding in one of our already dissected and macerated male cadaver.

Dudkiewicz *et al.*, (2005) did a follow up study on fifteen patients suffering from post-traumatic tibiofibula synostosis and found out that most of the patients suffered pain and limitation of ankle movements.

Tibiofibular synostosis affects the normal distal movement of the fibula relative to the tibia which results in shortening of the lateral malleolus and ankle

valgus as well as prominence of the fibula head at the knee (Frick *et al.*, 2001).

The history of the individual was not available in the present case, thus it is not possible to comment upon the cause of the synostosis neither can we comment on the symptoms experienced by the individual when alive but we assume that the fractures of the tibia and fibula and a severe hematoma around the interosseous membrane are the possible pathogenesis of this distal tibiofibula synostosis. The calcification of the hematoma resulted in bony fusion of tibia and fibula and thus may prevent normal ankle function which might lead to ankle pain since tibiofibular synostosis does prevent fibula descent especially during midstance and preswing phase of gait cycle (Jiang-Hue 2003). This downward movement helps to deepen the ankle mortise and tighten the interosseous membrane thereby stabilizing the ankle during maximum weight-bearing and stress (McMaster and Scranton 1975). Our case died probably not knowing the reason for his disability. They emphasize meticulous attention to hemostasis and the use of bone wax as essential technical points in preventing a recurrence.

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