



## CASE REPORT

# Treatment of proximal radioulnar synostosis using a posterior interosseous antegrade flow pedicled flap<sup>☆</sup>

F. Martínez-Martínez<sup>a,\*</sup>, J.M. Moreno-Fernández<sup>a</sup>, A. García-López<sup>c</sup>,  
V. Izquierdo-Santiago<sup>b</sup>, S. Illan-Franco<sup>a</sup>

<sup>a</sup> Servicio de Traumatología y Cirugía Ortopédica, Hospital Universitario Virgen de la Arrixaca, Murcia, Spain

<sup>b</sup> Servicio de Cirugía Plástica y Reparadora, Hospital Universitario Virgen de la Arrixaca, Murcia, Spain

<sup>c</sup> Servicio de Traumatología y Cirugía Ortopédica, Hospital General Universitario de Alicante, Alicante, Spain

### KEYWORDS

Synostosis;  
Radioulnar;  
Treatment

**Abstract** The aim of this study is to determine the different therapeutic options described for the treatment of radioulnar synostosis, and report our experience with posterior interosseous antegrade flow pedicled flap with technical amendments. Two patients, who were treated with the designed flap, and with more than one year of follow-up, were reviewed. The technical innovations, end result and complications are described. In the two cases described, there was no recurrence of synostosis, which is the most frequent complication described in this condition, and no postoperative complications were observed. In the literature, many filler materials, from artificial to biological, free or vascularized, have been used the radioulnar space after excision of synostosis. The technique that provides the best results is the interposition of muscle or vascularized adipofascial flaps. The interosseous posterior antegrade flow pedicled flap is reliable, with a low morbidity, and is an effective alternative for the treatment of proximal radioulnar synostosis.

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### PALABRAS CLAVE

Sinostosis;  
Radiocubital;  
Tratamiento

### Tratamiento de la sinostosis mediante colgajo interóseo posterior

**Resumen** Nuestro objetivo es estudiar las diferentes opciones terapéuticas descritas para el tratamiento de la sinostosis radiocubital y, aportar nuestra experiencia con las modificaciones técnicas introducidas con posterioridad. Hemos revisado 2 pacientes con más de un año de evolución, que fueron operados con el colgajo reseñado; describimos las novedades técnicas, el resultado final y las complicaciones. En los 2 casos descritos existe ausencia de recidiva de sinostosis, complicación más frecuente descrita en esta enfermedad, con ausencia de complicaciones postoperatorias. En la literatura se han empleado numerosos materiales interpuestos en el espacio radiocubital tras la exéresis de la sinostosis, desde artificiales hasta biológicos libres o vascularizados; siendo la técnica de interposición de colgajos musculares o adipofascial vascularizados, la que ofrece los mejores resultados. El colgajo interóseo posterior pediculado

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\* Corresponding author.

E-mail address: [fmtnez@gmail.com](mailto:fmtnez@gmail.com) (F. Martínez-Martínez).

de flujo anterógrado es una alternativa fiable, de poca morbilidad y, efectiva para el tratamiento de la sinostosis radiocubital proximal.

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## Introduction

Radioulnar synostosis is a heterotopic ossification of the interosseous membrane of the forearm which blocks rotational movements, representing a significant limitation for basic everyday activities.<sup>1</sup> Its origin can be congenital or posttraumatic.

The most common form is the congenital, with post-traumatic occurrence being relatively uncommon. The true incidence of posttraumatic radioulnar synostosis is unknown, but it is estimated to appear in 1.2<sup>2</sup>–6.6%<sup>3</sup> of patients with fractures of one or both forearm bones treated with compression plates. In addition, there are other risk factors arising from the type of local lesion (open fracture, comminution and associated dislocations), surgical technique (approaches,<sup>4</sup> immobilization or repair of the distal biceps insertion in up to 7%<sup>5,6</sup>) and other distant lesions and the condition of patients (traumatic brain injury [TBI], in up to 18% of cases<sup>7</sup>).

This lesion can be located along the various thirds of the forearm. Its length in the proximal third can vary and affect the elbow joint.

Multiple treatment alternatives have been proposed, with the surgical option being the first choice. Isolated resection of the calcifications has a high rate of recurrence, so various techniques for interposition of artificial or biological material to act as a barrier between both bone surfaces have been developed. Traditionally, materials such as silicone,<sup>8–10</sup> bone wax<sup>11</sup> and soft parts like free fat<sup>11–13</sup> have been used. However, these techniques were not able to prevent recurrence and non-vascularized<sup>14</sup> tissue could be replaced by necrotic tissue. Subsequently, especially in the cases of congenital synostosis, interposition techniques using vascularized tissue from the anconeus,<sup>15</sup> *brachioradialis* and *flexor carpi ulnaris* muscles,<sup>16</sup> vascularized, pedicled or free flaps<sup>17,18</sup> were employed using the radial or posterior interosseous artery.<sup>19–23</sup>

The use of posterior interosseous adipofascial flaps in radioulnar synostosis with a posttraumatic origin has been sparsely described prior to article.<sup>19,22,23</sup> This highly useful flap was originally described by Zancolli and Angrigiani in 1988,<sup>24</sup> and Penteado et al. in 1986.<sup>25</sup>

Multiple adjuvant treatments with NSAIDs have been proposed in conservative treatments, such as indometacin, perioperative irradiation at low doses<sup>26,27</sup> and postoperative rehabilitation which may prevent recurrence.

We present 2 cases in which we used the adipofascial posterior interosseous flap with antegrade flow to interpose it as biological material at the focus of synostosis following its excision in order to prevent recurrence of the lesion.

## Case reports

### Case 1

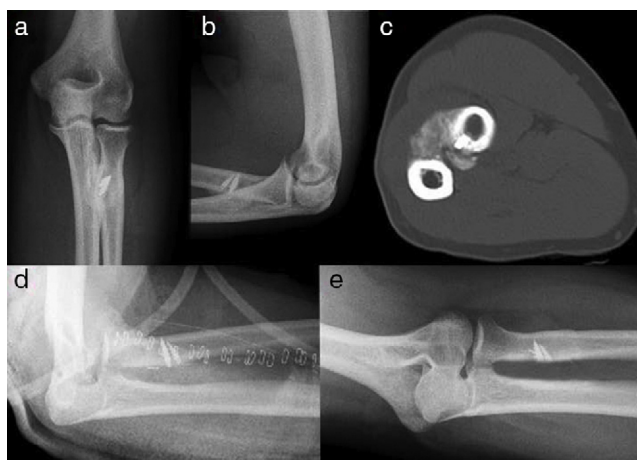
A 45-year-old male who suffered a posttraumatic rupture of the *biceps brachii* insertion tendon at the level of the

radial tuberosity in his left arm while carrying out his work activities, without any other associated injuries. Tendon reinsertion was performed using 2 metal harpoons and posterior rigid immobilization was established for 4 weeks.

During the rehabilitation process, the patient presented a blockage of forearm pronosupination at 75° pronation. Plain radiographs (anteroposterior and lateral) and a computed tomography (CT) scan of the affected elbow were obtained, showing a bone bridge in the proximal third of the radius and ulna at the level of the radial tuberosity (Fig. 1). The patient was diagnosed with radioulnar synostosis, type III in the Vince classification<sup>28</sup> or proximal type IIIA in the Jupiter classification.<sup>11</sup>

The patient was scheduled for surgery (Fig. 2), which was carried out through a posterior forearm approach which enabled excision of the heterotopic calcifications. Recovery of the passive rotational movement of the forearm, with full articular balance, was verified immediately.

Subsequently, we performed an interosseous posterior fascio-fatty flap with antegrade flow through distal extension of the posterior approach, and an 8–10 cm dissection of the subcutaneous fascio-fatty plane between the *extensor carpi ulnaris* and *extensor digiti minimi* including the septum between both where the posterior interosseous artery, along with its vein, was located. A 6–8 cm wide adipofascial pedicled flap with antegrade flow was obtained. Next, it was turned 180° so that the distal third of the flap could be interposed at the site of calcification between both bones, in order to prevent recurrence of the lesion. A small anterior incision was made to recover the flap and attach it to the skin through suture and a dermal button, so it prevented mobilization and retraction of the interposed tis-



**Figure 1** Images (a) and (b) show anteroposterior and lateral radiographs, whilst (c) is the CT scan showing the synostosis generated after the implantation of harpoons for the reinsertion of the biceps tendon. The inferior line shows the radiographs in the postoperative period (d) and at 1 year (e) with absence of synostosis.

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