Complete removal of the epitrochleoanconeus muscles in patients with cubital tunnel syndrome: results from a small prospective case series

Godard de Ruiter [1] and **Sjoerd van Duinen** [2], Departments of Neurosurgery [1] and Pathology [2], Hague Medical Center, The Hague, The Netherlands

Introduction

In about 3% of all surgical procedures for cubital tunnel syndrome the surgeon is faced with an anomalous muscle, called the **epitrochleoanconeus muscle (EM)**. This muscle, which is normally present in monkeys, probably is a remnant of evolution that in most humans has evolved into the Osborne ligament.
Different surgical strategies how to decompress the ulnar nerve (UN) in the presence of this muscle have been proposed, including **myotomy**, **myectomy** or **transposition** of the ulnar nerve. In this study, we prospectively followed a small series of patients, in which the muscle was completely removed.

Methods

All patients that were treated between January 2014 and June 2016 for primary, persistent or recurrent symptoms of cubital tunnel, and in whom an epitrochleoanconeus muscle was encountered before or during surgery were included. Sonographic analysis was performed (Figure 1A) in case the presence of an epitrochleoanconeus muscle was suspected during clinical examination. An additional MRI scan was made if the presence could not be ruled in or out on the basis of this analysis (Figure 1B).

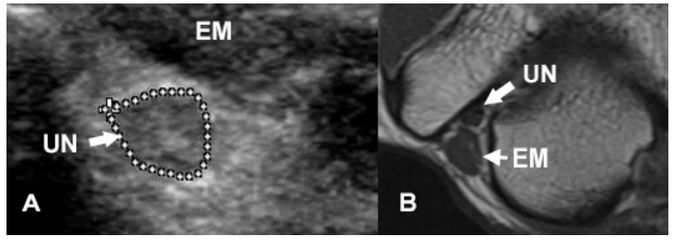

Figure 1: ultrasonopgraphy (A) and MRI (B) showing relation of ulnar nerve (UN) and epitrochleoanconeus muscle (EM)

Intraoperatively, the ulnar was exposed just proximally to the two heads of the flexor carpi ulnaris (FCU) muscle and was released in a **proximal direction**. Specific attention was paid to the presence of a prominent medial head of the triceps and the absence of the Osborne ligament (Table 1). The epitrochleoanconeus muscle was completely removed by coagulation and transection of respectively the insertio on the medial epicondyle and the origo on the olecranon (Figure 2).

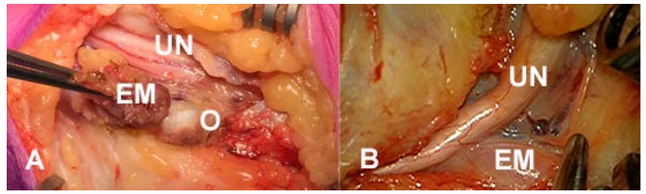

Figure 2, UN= ulnar nerve, EM =epitrochleoanconeus muscle, O = olecranon, forceps in figure B points at separate nerve branch that innervates the EM

After resection the elbow was flexed to determine if there was (sub)luxation of the ulnar nerve and/or residual compression by a prominent medial part of the triceps (Table 1).
Outcome was assessed in the outpatient clinic and graded using the Likert scale. Likert grade 1 or 2 were regarded as a good outcome.
In addition, histopathologic analysis was performed on resected muscles with ATPase histochemistry staining slow (type I) muscle fibers 'light' and fast (type II) muscle fibers 'dark'

Results

The epitrochleoanconeus muscle was encountered in a total of 5 patients who were referred for cubital tunnel surgery (total of 7 cases, with bilateral epitrochleoanconeus muscles in two patients). Characteristics of the patients are presented in Table 1.
Most patients (4 out 5) had complete relief of symptoms (Likert 1) at the first follow-up (6 weeks). Only one patient (Case 4) had persistence of symptoms, which in his case consisted of numbness and weakness.

Patient Number	Age (year)/Sex	Arm	Sport	Preoperative Dellon Grade	Preoperative MRI/US	Anesthesia	Osborne's Ligament	Prominent Triceps/ Resection	Pathologic Analysis	Likert
1	36/F	L		I		General	No	Yes/no	Only paraffin	1
		R		I		General	*	Yes/no	GA, TG	1
2	34/F	L	Judo	I		General	No	Yes/yes	H, GA, TG	1
3	52/M	L		I	US	General	No	Yes/yes	H, GA, TG	1
		R		I	MRI	General	No	Yes/yes	H, GA, TG	1
4	74/M	R		II	US†	Local	No	Yes/no	H, GA, TG	3
5	23/M	R	Tennis	I	US	General	No	Yes/yes	H, GA, TG	1

GA, grouped atrophy; H, hypertrophy; TG, type grouping of type I and/or II muscle fibers; MRI, magnetic resonance imaging.
*Case of recurrence after previous myotomy.
†Initially missed on US.

Table 1: patient characteristics, work-up, intraoperative findings and cilinical outcome

Histopathologic analysis of the resected epitrochleoanconeus muscles (EM) showed grouped muscle fiber atrophy (Figure 3A) and type grouping (Figure 3B) both signs of muscle denervation possibly caused by compression of the innervating nerve branch (Figure 2B) that runs under the EM.

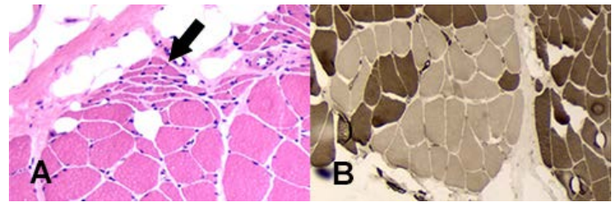

Figure 3A H&E stain: arrow points at grouped atrophy of muscle fiber,
Figure 3B: type grouping of light (type I) and dark (type II) muscle fibers

Conclusions

Complete excision of the epitrochleoanconeus muscle in patients with cubital tunnel syndrome often leads to complete recovery of symptoms. Further support for this surgical surgical strategy was found from histopathologic analysis.
Consequences of this surgical strategy are that careful preoperative work-up with ultrasonography and/or MRI should be performed in all cases of cubital tunnel syndrome and that the procedure should be performed under general anesthesia.