C ompression of the median nerve is most common within the carpal tunnel. When there are signs of median nerve compression, carpal tunnel syndrome deserves first thought. However, the median nerve may be compressed more proximally, and if this is not considered, an erroneous diagnosis may be made. Other sites of potential compression of this nerve of the brachial plexus include at the lacertus fibrosus (bicipital aponeurosis), ligament of Struthers, between the heads of the pronator teres, by anomalous muscles such as an accessory head of the flexor pollicis longus (Gantzer’s muscle), and by the sublime bridge, which is the tendinous arch connecting the radial and humeral heads of the flexor digitorum superficialis muscle (Fig. 1). This final muscle arises from the radius near the radial tuberosity and from the common flexor tendon attached to the medial epicondyle. As it descends into the forearm, the median nerve first traverses between the 2 heads of the pronator teres (if both heads exist, which is more common [approximately 85%]). and then enters deep to this tendinous arch of the flexor digitorum superficialis. Although the sublime bridge is a potential site of median nerve compression, only scattered case reports exist regarding entrapment of this nerve at this site.

To date, no anatomical study has been performed that addresses the sublime bridge or its detailed relationships to the median nerve. The aim of the present study was to elucidate further this potential site of median nerve compression.

M ethods

Thirty formalin-fixed adult cadavers (60 sides) (age range 50–89 years, mean 72 years) underwent dissection of the anterior forearm. Special attention was given to the proximal origin of the flexor digitorum superficialis
The sublime bridge

Twenty female and 10 male specimens were used for the study. Measurements included the proximal and distal widths of this bridge and the length of the bridge measured from the medial epicondyle to its apex. All measurements were made using a ruler and calipers. Statistical analysis regarding sex and sides was made using SPSS version 10 for Windows. Statistical significance was set at p < 0.05.

Results

The sublime bridge was found to be tendinous in the majority (45 [75%]) of specimens and muscular in the remaining forearms (15 [25%]) (Figs. 2 and 3). The maximal width of the sublime bridge, an arched structure, ranged from 4 to 12 cm (mean 7 cm) proximally, and the minimal width ranged from 1 to 6 cm (mean 3 cm) distally. The mean distance from the medial epicondyle to the apex of the sublime bridge was found to be 8.1 cm (range 7–9.4 cm). The relation of the median nerve to the bridge was always intimate (Fig. 2). On 2 sides (1 left and 1 right from different male specimens), the median nerve was attached to the deep aspect of the sublime bridge by a strong connective tissue band, thus forming a tunnel on the deep aspect of this structure. Additionally, the anterior interosseous branch (Fig. 3) of the median nerve arose proximally to the sublime bridge in all specimens, which would not exclude compression of this branch at this site.

With range of motion of the forearm, increased compression of the median nerve was seen with extension of the elbow but with no other movement. There were no signs of past trauma or surgical incisions to the area dissected, and no atrophy was observed in the muscles supplied by the median nerve in the forearm and hand. No statistical difference was observed between left and right sides or between sexes (p > 0.05).

Discussion

Unfortunately, many case series of median nerve entrapment in the proximal forearm, termed the pronator (teres) syndrome, have included patients with compression of this nerve at the sublime bridge. Patients with this syndrome usually present with a history of constant repetitive pronation/supination of the forearm and typically complain of pain or paresthesia over the anterior forearm and lateral 3.5 digits that increases with forced pronation. As found in our study, only extension of the elbow placed the median nerve under increased compression by the overlying sublime bridge; therefore, the finding of increased symptoms with pronation would more or less exclude compression at the sublime bridge (Table 1). Interestingly, Wertsch and Melvin reproduced pain in the proximal forearm in patients with compression of the median nerve at the sublime bridge with resistance to flexion of the distal tendon of the flexor digitorum superficialis of the third digit. Of note, for the median nerve, conduction velocities may be slowed in the forearm, but distal sensory and motor latencies are normal unless there is an associated carpal tunnel syndrome.

Rengachary has stated that, although there may be subtle clinical differences between entrapment of the median nerve at the lacertus fibrosus, pronator teres, and sublime bridge, in most instances it is impossible to differentiate which of these sites is responsible for nerve compression. Moreover, this author extolled that surgery for entrapment of the median nerve at the elbow may be
incomplete unless each of these sites is examined.\textsuperscript{11} In other words, exploration for proximal median nerve entrapment is not complete until the nerve is explored from the lacertus fibrosus to the sublime bridge. We agree that the findings may be similar, but as found in our study, symptoms with elbow extension would most likely indicate compression at the sublime bridge. Our measurements of the distance from the medial epicondyle to the sublime bridge along with palpation could assist the surgeon in localizing this site of compression. Additionally, the anterior interosseous branch of the median nerve arose proximally to the sublime bridge in all specimens, which would include compression of this branch at this site.

Hartz et al.\textsuperscript{5} reviewed their experience with pronator syndrome in 39 patients. Twelve of these patients were found to have taut fibrous arches of the flexor digitorum superficialis (that is, the sublime bridge). The patients in this series with good or excellent postoperative compressive results were those in whom a taut sublime bridge or lacertus fibrosus was identified. Olehnik et al.\textsuperscript{9} reviewed 39 patients with median nerve entrapment in the proximal forearm. Of these, 22 were found to have compression at the sublime bridge and 4 at both the sublime bridge and pronator teres.

### Conclusions

We have defined and quantitated the anatomical structure referred to as the sublime bridge. Additionally, we found that at the sublime bridge, extension of the elbow places maximal tension on the deeper coursing median nerve with pronation and supination placing no additional tension to the nerve at the sublime bridge. Therefore, the pronator syndrome is an incorrect term applied to compression of the median nerve at the sublime bridge. Our hopes are that these data will be of use to the neurosurgeon in the diagnosis and surgical treatment of proximal median nerve compressive neuropathies.

### Disclaimer

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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