Mini dorsal incision to the triangular fibrocartilage complex: a new surgical approach

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Abstract The purpose of this paper is to describe a mini dorsal approach to the triangular fibrocartilage complex (TFCC). We describe a mini incision approach which aims to preserve the structure and proprioception of the primary and secondary stabilisers of the wrist joint. This approach requires less dissection and provides adequate exposure to the distal aspect of the TFCC and allows visualisation of the distal radial ulna joint (DRUJ) with complete TFCC lesions.

Keywords Triangular fibrocartilage complex · Surgical approach · Mini incision · Proprioception

Introduction

The triangular fibrocartilage complex (TFCC) is an important stabiliser of the distal radial ulna joint (DRUJ) [10]. Injuries to the TFCC can lead to ulna-sided wrist pain and instability. In recent years, literature has focused on arthroscopic techniques to treat certain pathol-

ogies of the TFCC. However, indications for an open approach to the structure still remain, including the repair of complex tears and foveal reattachments [6], and in certain cases of DRUJ instability [12, 16]. Various surgical approaches have been described, including palmar [13] and dorsal approaches [2]. We present a dorsal mini incision approach, which provides adequate exposure to the TFCC.

Anatomical Considerations

The dorsal sensory branch of the ulna nerve has been shown to have a predictable and consistent course, and requires protection during surgery as the TFCC is approached [4, 17, 19].

The primary stabilisers of the DRUJ are the palmar and dorsal radioulnar ligaments [13]. Each radioulnar ligament divides into deep and superficial limbs, which attach into the fovea and ulnar styloid, respectively. The secondary stabilisers are made up of the extensor carpi ulnaris (ECU) tendon, the ulnocarpal ligaments, pronator quadratus and the radioulnar interosseous membrane [6]. Of these, the ECU is the most important [5, 14]. Hence, emphasis is made to protect the ECU subsheath [6]. De Smet, in his original 1992 description of an ulnar wrist approach specifically described the relocation and repair of the ECU subsheath [2].

The primary and secondary stabilisers of the carpus and DRUJ are dynamic structures, which provide proprioceptive feedback and consequently, tertiary stability through surrounding muscular stimulation [8, 9]. Extensive dissection of these stabilisers may result in additional instability by interrupting proprioceptive pathways. The effect of this may prolong recovery and jeopardise a return to full pre-injury level of function.

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Fig. 1 Longitudinal incision made in the fifth extensor compartment with exposure of extensor digiti minimi (EDM)

Previous Surgical Approaches

The initial approaches to the ulnar aspect of the wrist were published in the mid 1980s [1, 18]. De Smet and Fabry combined and modified these approaches and published their description in 1992 [2]. This approach utilises a longitudinal incision along the dorsal aspect of the distal ulna, with an ulnar-based chevron over the ulna head to access the extensor retinaculum. The DRUJ is approached between the fourth and fifth compartments, with the ECU displaced ulnarward before being replaced and secured with a retinacular flap.

Garcia-Elias et al. have described a universal approach to expose the DRUJ, TFCC, lunotriquetral joint and distal ulna [6]. In this approach, a Z-shaped incision is centred over the distal ulna. The extensor retinaculum is divided longitudinally through the fifth compartment dorsally, and the ulna septum is divided to expose the ECU tendon and its subsheath. A capsular incision is then made radial to the ECU in order to protect it and its subsheath.

Mini Dorsal Incision to the TFCC

The previously described techniques offer excellent visualisation to both the TFCC and DRUJ. However, we propose a modified technique, which offers less extensive dissection of the soft tissue surrounding the TFCC, and adequate visualisation of underlying structures for peripheral and central TFCC tears not amenable to arthroscopic repair. We believe this technique results in decreased trauma to the nerves innervating the wrist, which in turn may equate to higher proprioceptive levels following surgery compared with traditional approaches.

A 3-cm longitudinal incision is made starting 1-cm distal to the DRUJ extending towards a point 1 cm proximal to the base of the fifth metacarpal. Care must be taken to protect the dorsal sensory branch of the ulna nerve at the ulna most aspect of the incision.

This approach is distal to the extensor retinaculum, making it easy to identify the extensor tendons. A longitudinal incision is made in the fifth extensor compartment and the extensor digiti minimi (EDM) is exposed (Fig. 1). The fourth extensor compartment is elevated off the dorsal capsule. Retraction of the tendons with a small ‘West’ retractor provides good exposure to the dorsal wrist ligaments and capsule.

The triquetrum is identified by palpation of the bony prominence immediately distal to the ulna head and is key to the safe exposure of the TFCC. It provides the distal insertion of the dorsal radio lunotriquetral ligament (RLTrq) which is identified as a condensation of capsule or obliquely orientated fibres. An oblique incision is made in line with the proximal edge of this structure. The incision should start distally on the triquetrum bone and progress carefully in an oblique proximal radial direction. A single oblique incision can be made to visualise and assess the TFCC (Fig. 2). A transverse component can be added for increased exposure (Fig. 2a).

Having made the small incision over the triquetrum, the radiocarpal joint is exposed through this capsular split. It is

Fig. 2 A single oblique incision to visualise and assess the TFCC with further exposure obtained through a transverse component

Fig. 3 Exposure of the radiocarpal joint through a capsular split with further exposure of the TFCC through a proximal incision in the oblique line of the ligament

then a simple dissection to continue the incision proximally in the oblique line of the ligament until the TFCC is seen from above (distally) (Fig. 3). The dorsal ulnocarpal ligament [3] can then be incised transversely in an ulnar direction distal to the edge of the dorsal radioulnar ligament (DRU) and articular surface of the TFCC, which is viewed under direct vision from above (Fig. 3a).

This approach has the advantage of starting the dissection at the triquetrum, and developing the dissection to the dorsal edge of the TFCC and dorsal DRU ligament. Fully flexing the radio carpal joint and positioning the hand in radial deviation enhances exposure (Fig. 4). For closure, the dorsal ulnocarpal ligament is repaired with interrupted absorbable sutures, and the skin is closed.

Fig. 4 Flexing the radio carpal joint and positioning the hand in radial deviation enhances exposure to the central part of the TFCC

Discussion

The midportion of the RLTrq ligament contains an array of mechanoreceptors within its epifascular region [15], and various studies show pronounced innervation to this ligament compared with neighbouring ligaments [7, 11]. This suggests it is an important ligament in providing proprioceptive feedback of wrist movement. We postulate that minimal disruption to the dorsal carpal ligaments, ECU subsheath and DRUJ will lead to less proprioceptive damage than more extensive approaches to the TFCC.

Disadvantages of this approach in preserving the proprioceptive feedback of surrounding structures, in our mini incision, is that it is not possible to perform a formal synovectomy

or explore the DRUJ, unless a complete tear is present. In these cases, the TFCC can be carefully retracted to visualise the DRUJ. In our experience, patients requiring concurrent synovectomy, usually have a degree of degeneration, and in this patient group, we suggest a more extensive approach to the TFCC.

If a more proximal lesion is suspected, following visualisation of the TFCC through the initial oblique capsular incision, we suggest continuing the capsular approach proximally in a longitudinal fashion, as described by Garcia-Elias [6], rather than adding the transverse limb as described in our approach.

This approach is technically simple providing the dissection starts distally at the triquetrum, and the capsulotomy progresses proximally until the TFCC is exposed from above (distally). There is a learning curve associated with this approach, and one would be advised to attempt the dissection on one of the many cadaveric courses available. However, we encourage a mini dorsal incision for repair of complex TFCC tears in patients, in order to minimise possibly damaging dissection and maintain proprioception.

Conflict of Interest Saqib Javed declares that he has no conflict of interest.

David Murray declares that he has no conflict of interest.

Mike Hayton declares that he has no conflict of interest.

Statement of Human and Animal Rights This article does not contain any studies with human or animal subjects.

Statement of Informed Consent Statement of informed consent: patient is not identifiable from this report.

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