Title

Perceptions and experiences of wrist surgeons on the management of Triangular Fibrocartilage Complex tears: a qualitative study.

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Informed consent

Participants were emailed a participant information sheet and consent form. Written consent was obtained before commencing the interview with the researcher.

Abstract

There is lack of consensus on the management of triangular fibrocartilage injuries. The aim of this study was to investigate wrist surgeons' experiences and perceptions regarding treatment of triangular fibrocartilage complex injuries and to explore the rationale behind clinical decision-making. A purposive sample of consultant wrist surgeons (*n*=10) was recruited through 'snow-balling' until data saturation was reached. Semi-structured interviews were conducted, digitally recorded and transcribed verbatim. Two researchers independently analysed data using an iterative/thematic approach. Findings suggest that surgeons rely more on their own training and experience, and patient-related factors such as individual expectations, rather than on published material, to inform their decision-making. Current classification systems are largely considered to be unhelpful.

Level of evidence: V

INTRODUCTION

The management of triangular fibrocartilage complex (TFCC) injuries is difficult. Published studies are mostly low-level evidence, biased towards surgical intervention and with limited consensus of opinion. Furthermore, it is not known whether operative intervention gives better results than the natural course of the tear (Chan et al., 2014).

There are no longitudinal studies comparing the efficacy of the various non-surgical treatment options (Barlow, 2016; Park et al., 2010). Given the poor evidence that is currently available, little is known about what influences clinical decision-making in the management of TFCC tears.

Factors influencing the 'decision to operate' have been investigated in other surgical settings, such as in emergency general surgery (Szatmary et al., 2010). The threshold for choosing surgical management may be affected by differences in clinicians' preferences and beliefs (Birkmeyer et al., 2013), personality (Teunis et al., 2015) and previous operative outcomes (Szatmary et al., 2010). Patient care is largely driven by surgeons' training, experience and judgement when the evidence supporting surgical practices is poor (Tubbs et al., 2006).

The aim of this study was to explore the perceptions and experiences of consultant wrist surgeons managing TFCC injuries, with the purpose of understanding the factors informing "expert" clinical decision making. This might help to explain existing variations in TFCC management, guide future research and inform clinical care.

METHODS

This study adopted a qualitative methodological approach. This allows the exploration of experiences, perceptions, meanings, beliefs, attitudes and processes to understand how phenomena of interest are socially constructed (Hansen, 2006). Semi-structured interviews allow in-depth investigation of a topic of interest using a set of pre-determined open questions informed by existing knowledge, for example, experience and published research (Grbich, 1999). They also provide flexibility to pursue new themes as they arise, acknowledging that the researcher does not know all the questions before the start of the study (Rice and Ezzy, 1999). Although time-consuming, this allows the exploration of in-depth accounts and the identification of new topics of interest, which is

not feasible with a questionnaire or structured interview. This is an iterative process, with ongoing reflection to 'mature' the interview structure over the course of the interview period with accompanying adaptation of the interview guide (Hansen, 2006). In this study, qualitative semi-structured interviews were used to investigate experts' perceptions and experiences regarding the management of TFCC injuries and explore the rationale behind clinical decision-making in a UK setting.

To identify the initial questions for the interview guide, a review of publications on the management of TFCC tears was carried out with the help of an information specialist, who developed the search terms (Table 1); this identified a range of management choices, uncertainty around best practice, and a lack of clear empirical evidence for any particular approach.

The initial semi-structured interview guide was developed using this information and the experience of the research team. The nature of the interview process meant that new areas of interest which arose (such as the influence of patients' expectations and clinicians' understanding of the natural history of TFCC tears) were embedded in the final interview guide. Supplementary Document 1 (available online) provides the initial and final interview guides.

Participants were consultant hand surgeons in the UK with an interest in wrist pathology, experienced in the management of TFCC tears and wrist arthroscopy. Participants were 'purposively' sampled to include a range of surgeons who favoured surgical and non-surgical approaches (Rice and Ezzy, 1999). Four initial participants were identified by an independent senior hand surgeon. These initial interviewees then identified other potential participants via a sampling process known as "snowballing" (Hansen, 2006); existing participants recommended other individuals within their network of UK hand surgeons. Participants were recruited via personal email addresses and sent an information sheet and consent form. Reply to the principal investigator (VR) was used to establish a date for the interview.

The researcher (VR) obtained written consent and conducted, digitally recorded and transcribed verbatim all interviews. Data collection and analysis was an iterative and emergent process; new themes were added to the interview guide as they arose and recruitment stopped once 'saturation' of emerging themes was achieved. Data saturation is considered the point at which no new themes arose from the data (Bryman, 2004; Strauss and Corbin, 1998), suggesting that further interviews would be unlikely to add significant information.

Participants were allocated 4 weeks to reply to the recruitment email. Two to three participants were recruited at a time and their interview data were analysed before further recruitment. No new themes arose during analysis of the eighth and ninth interviews. To confirm with confidence that data collection had reached saturation point, two further potential participants were emailed but only one replied. This was the only time in the recruitment process when a reply was not received. It was evident, however, that data saturation had been achieved after the tenth interview as this was the third consecutive time that no new themes had arisen during data analysis, and therefore no further recruitment was required.

Data were analysed independently by two authors (VR, AF) using a thematic analysis: "a method for identifying, analysing and reporting data" (Braun and Clarke, 2006). This approach involved six stages starting with familiarization with the data (stage 1), followed by the identification of recurring areas of interest, known as 'themes' (stage 2). Transcripts were then re-read and an interpretative analysis of the initial themes was done to create sub-themes (stage 3). Stage 4 involved combining the independent analysis of the two authors and stage 5 resulted in the culmination of a finalized list of agreed themes which were approved by the senior author (CD), to improve rigour (Hansen, 2006). The final stage of interpretation (stage 6) involved creating the narrative report in which the themes were discussed relative to the existing evidence base and the research question.

RESULTS

The review of publications used to develop the initial interview guide revealed various controversies in the current management of TFCC tears.

Controversies about the management of central TFCC tears:

- Studies fail to agree on the relative merits of arthroscopic debridement or an ulnar shortening procedure for central tears. This uncertainty is further complicated when assessing the benefits of each treatment option in the context of a neutral (or negative) ulnar variance (UV) and when there is a positive UV when ulnocarpal abutment would be more likely (Minami et al., 1996; Moldner et al., 2015; Nishizuka et al., 2013; Osterman, 1990; Tomaino and Weiser, 2001;).
- Ulnar shortening is done either by an extra-articular ulnar shortening osteotomy (USO) or an arthroscopic intra-articular 'wafer' resection. There is no consensus on the criteria for each procedure, nor whether one is better than the other. Both techniques were considered to be successful in a retrospective review of 22 patients; however, the cases studied were not matched for UV (Constantine et al., 2000).

Controversies about the management of peripheral TFCC tears:

Combined case-series evidence supports successful outcomes for repair in cases with distal radioulnar joint (DRUJ) instability (Atzei, 2009; Atzei et al., 2015; Corso et al., 1997; Shih et al., 2002). Despite this consensus, there is controversy about other aspects of peripheral tear management:

- The role of surgical repair for peripheral tears with a stable DRUJ. Four case-series studies support favourable outcomes for repair (; Reiter et al., 2008; Trumble et al., 1996; Wysocki et al., 2012; Yao and Lee, 2011) whilst a retrospective case-series of 31 stable 1B tears demonstrated satisfactory-to-excellent outcomes after arthroscopic debridement, comparable to those of repair (Cardenas-Montemayor et al., 2013).

- The merits of using arthroscopic techniques over open surgery in peripheral tears remains inconclusive (Anderson et al., 2008; Luchetti et al., 2014).

In this qualitative study, the ten consultant wrist surgeons are referred to as Participants (P) 1 to 10. They were interviewed between May and July 2016. Experience as a consultant varied from 3.5 to 24 (mean, 13) years and participants were from different regions of England. The mean duration of interview was 52 (range, 31-87) minutes.

Three main themes, patient factors, expert assessment and evidence base emerged as underpinning clinical decision-making in the management of TFCC injuries (Table 2). The themes and subthemes are further presented below.

Patient factors:

Patient-related factors were important when formulating a management plan. Identifying normal age-related findings and the presence of hyperlaxity were the key biological factors discussed, and psychosocial elements such as patients' own values and expectations were also considered.

Psychosocial issues: Patient values and expectations

All participants reported the importance of addressing patients' values and expectations in the management of TFCC tears. They highlighted problems in 'labelling' patients with a tear because to patients, this may imply something that requires 'mending'.

"*They usually expect surgery and the problem is that the majority of patients now who get referred with TFCC repairs, particularly now from general practice, have got a bit of a perforation that probably doesn't need an operation. So, over the age of 40/50 nearly everyone has got some sort of central perforation and I'm trying to get away from calling it a tear because tear makes people think it needs putting back together and repairing."* (P3)

Occupation and sporting demands were considered particularly important in influencing management. A number of the participants (*n*=6) felt there was a greater expectation from those with demanding jobs to have interventions that were curative and/or required minimal time off work.

"You have to compare a professional sports athlete with a farmer or self-employed person. They all have, sort of, Formula 1type' expectations and they need to go back quickly into their jobs." (P9)

Biological issues: age-related findings and co-existing pathology

The importance of correctly identifying incidental degenerative TFCC lesions, which may represent normal age-related changes in older patients with ulnar-sided wrist pain, was discussed (*n*=3). Increasing age, per se, was not considered a contraindication to treatment but the importance of recognizing normal variants was emphazised to avoid unnecessary procedures:

"I think you can get central perforations in the TFCC which are normal and part of ageing, perhaps associated with degenerative type tears…I think they are often over-reported as pathological problems that need treatment and might guide you or coerce you into, you know, active treatment where none is necessary." (P2)

Hyperlaxity was identified by all participants (except P10) as a common finding in patients with ulnar-sided wrist pain suspicious of a TFCC injury. These cases were reported to require a more conservative approach, in view of having an underlying connective tissue disorder which would not necessarily be addressed by surgical management and may result in symptoms which recur or persist;

"I try very hard not to operate on them. One: because I don't think it's necessary and two: because some of them, there is a 'material' problem, so even if you do it, it's going to work for a while and may recur." (P6)

Expert assessment

Surgeons' individual perceptions and experiences were a key factor influencing the treatment options selected. The role of clinical expertise in establishing a working diagnosis was discussed. Variations were reported in surgeons' perceptions of pain pathophysiology for both central and peripheral tears and therefore differences in management choices for each tear type were also observed.

The role of clinical examination and investigations

The importance of establishing a working diagnosis, by relying on individual expertise such as history-taking and clinical examination skills, was advocated. A key aspect of clinical examination, recommended by all participants, was assessment of DRUJ stability by 'ballottement' in keeping with the techniques described by Garcia-Elias (2012) and Rhee et al. (2014). Seven participants also described using an impingement test in line with those described by Ahn et al. (2006) and Rhee et al. (2014) to elicit symptoms of ulnocarpal abutment. The emphasis was placed on further imaging being used mostly as a confirmatory tool, to support diagnosis and direct future management (*n*=3).

"If you don't make a diagnosis on taking a history and examination, and you just send them for an MRI scan, or an arthroscopy without knowing exactly what the clinical question is, you are going to have lots of incidental findings." (P6)

"I would not go on a fishing trip with an arthroscope. Unless I was convinced of definite clinical signs. I try to use arthroscopy as a confirmatory investigation." (P2)

Perceptions of pain pathophysiology

There was no consensus opinion on the underlying pathophysiology causing pain in both central and peripheral TFCC tears. Various potential causes were discussed by participants.

Impingement from ulnocarpal impaction/abutment (P6; P7) and synovitis (*n*=6) were both reported as possible causes of pain in central tears;

"I suspect that in central tears, the pain is caused by a degree of impaction…I guess its ulnocarpal impaction, being an impingement-type problem I suspect, but, we don't know" (P7).

"*Why that hurts, I don't know I'm assuming it's synovitis because the discs shouldn't hurt"* (P1).

DRUJ instability (P5; P6), ongoing traction on the tear (P7) or synovitis (*n*=5) were suggested as potential causes of pain in peripheral tears.

"*In terms of peripheral tears, I would assume there are some nerve endings there, there's ongoing traction on a tear and that causes it, does the abnormal joint movement cause pain? We don't know do we?"* (P7).

"I don't think that a peripheral tear without instability is going to cause symptoms, now OK yes there might be some that have a bit of synovitis in that area where it is just a bit inflamed" (P5).

The management of central lesions

Immobilization/splinting (*n*=10) and steroid injections into the ulnar arthroscopy '6R' portal (*n*=4) were recommended as non-surgical management options for central TFCC tears.

"On the degenerative side, often splinting them for a bit, or even a steroid injection may settle the synovitis they have, may take the pain away and settle them for a while, occasionally permanently." (P6).

After an unsuccessful trial of non-surgical treatment, participants reported using measurements of UV and signs of ulnocarpal abutment to help guide management. The notion that ulnocarpal abutment may occur in the absence of positive UV was an important discussion point, and was attributed to a dynamic mechanism of impaction (*n*=3) or to having a thicker TFCC (*n*=3).

"If you screen them with a fluoroscan, and you get people to make a grip, the difference in ulna length varies 3 to 4 mm and that is very significant, which proves that the ulnocarpal abutment is a dynamic problem." (P6)

"People who have a shorter ulna usually have a thicker TFCC. So in essence the space is still the same, it's just that there is more TFCC and less bone. So just because you've got a normal length ulna doesn't mean you can't have ulnar impaction." (P5)

Half of the participants suggested initial arthroscopic debridement or wafer procedure before considering USO, whereas the other half recommended USO, for cases with either positive UV or ulnocarpal abutment.

"My treatment for them is much more likely to be an ulnar shortening osteotomy. I tend to go for that first… to see if that settles it down and then I think about arthroscopically debriding the TFCC and doing a wafer excision as a secondary thing". (P3).

"Simple debridement first of all. And then also if they are very ulnar positive I'll try and shave their ulnar head arthroscopically… An ulnar shortening osteotomy is a pretty big operation…you are actually breaking the bone and putting a big plate on them... Technically I think it's a challenging operation and there is a non-union rate associated with it. So, I tend to try and do it simple if I can". (P10)

The management of peripheral lesions

In cases with a stable DRUJ, all participants supported splinting/immobilizing acute TFCC injuries. Steroid injections were also reported as a conservative management option (*n*=4). Debridement was suggested for some incomplete/partial peripheral tears (*n*=3). Surgical repair of a peripheral TFCC tear with a stable DRUJ was only recommended by six participants, due to variations in perceptions of pain pathophysiology.

"If you get a dorsal tear…there tends to be a gap where synovitis can creep through and maybe it's not instability but you do get pain, so I repair those." (P1)

*"If they don't have instability, to me the TFCC doesn't need repairing. They've got pain for some other reason. "(*P6)

In cases with DRUJ instability, all participants agreed that surgical repair of the TFCC is a successful management option. Two participants favoured a mini-open approach, seven favoured open repair and one preferred arthroscopic repair (converting to open repair if needed).

"I have not been able for the last 15 years to even consider doing arthroscopy because I can't safely reproduce the results I have with an open technique." (P9)

"'Once you get good at arthroscopy it's easier for you to do it arthroscopically than to do it openly." (P1)

Six participants suggested that some tears with DRUJ instability may be successfully treated with an initial trial of non-surgical management. In particular, successful outcomes were reported with splinting/immobilization (*n*=5) and with physiotherapy (*n*=5). However, P5 refuted a role for physiotherapy in the management of TFCC tears.

"With a splint or a cast for about 4 to 5weeks and reassess them. Because quite a few of them do scar up enough to be stable enough." (P7)

"Physiotherapy can help for the instability ones. If you strengthen them a bit, they may be able to control the joint dynamically themselves, particularly sporty people, they have good forearm muscles so that is worth trying." (P6)

Perceptions of the natural history and long-term consequences of chronic DRUJ instability also influenced the choice between surgical or non-surgical management.

"My concern about a chronically unstable joint is that over time it can potentially cause degenerative change within the joint and that's a much more difficult problem to deal with. So, I suppose the way I would discuss it with the patient is…it's probably better for the joint if it's made stable rather than left alone." (P5)

"If you look at long-term series of TFCCs not treated, the answer is they don't develop osteoarthritis." (P6)

Evidence-base

All participants placed a stronger emphasis on patient preferences and their own clinical experience and judgement rather than on published evidence. This was reflected in most participants using their own descriptive terminology, rather than published classification systems, for diagnosis. Significant knowledge gaps in the available evidence were well described, in particular the unknown natural history of TFCC tears.

Classification systems

Palmer's classification (Palmer, 1989) was mostly considered unhelpful in guiding management (*n*=7) and was reported to cause confusion between the radial-sided 1A and 1D subtypes (*n*=4):

"*The Palmer classification is one of those classifications where it tries to fit everything in, it doesn't really guide treatment. I'm not sure how reproducible it is and I suspect it's never been properly assessed in terms of inter-observer reliability."* (P2)

"The 1A or the 1D is sometimes mixed and misunderstood. And that means that when we try to talk about management, if we don't agree on what 1A and 1D is, then of course management will be completely different." (P9)

Participants reported using their own personalized descriptive methods to describe tears, instead of Palmer's classification (*n*=7);

"*Degenerative and traumatic, and whether they are central or more peripheral, and whether they are contributing to instability or not."* (P3)

Publications versus experience

All participants reported relying more on their own experience and training, including their personal surgical successes and complications, rather than on current published literature, to

inform their clinical decision-making for TFCC lesions. The available studies were largely considered to be of poor quality with little evidence which actually influences clinical practice (n=4). The only studies reported to aid decision-making were the low-level evidence supporting repair in DRUJ stability (P6) and the case-series which report technical procedures (P1).

"*It's largely my own experience, the experience of close colleagues, discussing cases, some literature, discussing cases in forums, at meetings, but largely experiential I would say*" (P2)

"*It's definitely not by the literature, because I think the literature is heavily biased…I just don't believe the literature and it's just on my own personal experiences.*" (P10)

Knowledge gaps/future research

Significant knowledge gaps were reported in the current evidence base by all participants. The importance of understanding the natural history of TFCC lesions, before further clarifying the role of existing surgical and other interventions was advocated (*n*=5). Other suggested areas of future research included comparing the various surgical management options for central tears with ulnocarpal abutment (*n*=3) and investigating the benefits of arthroscopic versus open repair techniques for peripheral tears (*n*=4). The need for a clear classification was recommended as a prerequisite for further clinically-relevant research (*n*=3).

"I don't think there are any good longitudinal studies looking at the actual natural history of low grade triangular fibrocartilage tears at all, or none that I've come across and I don't think there is much in the literature." (P2)

"*You have central tears with abutment, so one of the recommended treatments is debridement of the tear. And that would be a good experiment, if you are going to do a shortening anyway, just debride the tear in half of them, and don't debride the tear in the other half.*" (P6)

DISCUSSION

This study has highlighted key controversies in TFCC management and explored the rationale behind these reported differences in clinical decision-making. the findings suggested that surgeons rely more on their own training and experience, along with patient-related factors such as individual expectations, rather than on published material, to inform decision-making in TFCC management. These findings support those of Tubbs et al. (2006) who suggested that surgeons

use their own judgment when the evidence-base is weak, as well as the findings of Jacklin et al. (2008) that imply that surgeons use 'intuition and experience' when faced with uncertainty. Thus it would appear that in the light of a poor evidence-base, as is the case with TFCC management, surgeons rely on the remaining areas of an EBM model; patient values and expert opinion (Sackett, 1997) and reflect a model of 'shared' decision-making with the patient (Montgomery et al., 2001; Vranceanu et al., 2009).

Although there are limited reports discussing the role of non-surgical management for TFCC injures (Barlow, 2016; Park et al., 2010; Watanabe et al., 2010) some participants advocated non-surgical management as first-line treatment, even in the context of DRUJ instability. However, there is lack of consensus regarding the multiple non-surgical treatment options currently in use and the suitability of these options for each tear type is unknown. Indications for wrist immobilization varied between surgeons, depending on individual perceptions of symptom aetiology and natural history. Immobilization was considered particularly useful in settling episodes of synovitis, but perhaps also in cases with DRUJ instability. The role of splinting remains unclear in the current evidence available (Barlow, 2016; Park et al., 2010).

Physiotherapy was mostly supported in cases with a clinically unstable DRUJ, to improve dynamic stability by strengthening forearm muscles. However, there are no studies investigating this in the current evidence base and P5 denied successful outcomes with physiotherapy in his experience of TFCC management.

The indications for steroid injection also varied between surgeons, based on their perceptions of pain aetiology and natural history. Some participants reserved steroid injections for degenerative lesions and to settle synovitis. Others reported resolution of symptoms with steroid injections for some painful peripheral tears. However, although steroid injections are mentioned as a conservative treatment option for TFCC lesions (Watanabe et al., 2010) there have been no studies of the results.

The merits of arthroscopic versus open TFCC repair, the role of arthroscopic debridement versus ulnar shortening surgery for central lesions, and the surgical management of peripheral tears (without DRUJ instability) varied between participants. The decision-making process behind whether to carry out an arthroscopic or open TFCC repair appeared to be influenced by previous surgical outcomes and complications (Szatmary et al., 2010), risk-avoidance behaviours (Tubbs et

al., 2006) and personal confidence in the ability to perform each technique. Although it was suggested by P1 that, with increasing experience, it may be easier to perform repairs arthroscopically rather than via an open approach, such a trend was not fully supported by the more senior surgeons in the cohort. This reflects how aspects of surgical management may be influenced by differences in clinicians' preferences and beliefs (Birkmeyer et al., 2013). Despite the general trend towards arthroscopic surgery, the results of using arthroscopic over open techniques for TFCC repair have not been shown conclusively to be better (Anderson et al., 2008; Luchetti et al., 2014).

The studies supporting the surgical management of central lesions are inconsistent (Minami et al., 1996; Möldner et al., 2015; Nishizuka et al., 2013; Osterman, 1990; Tomaino and Weiser, 2001). Our findings also showed variations in the reported management of central lesions that did not respond to non-surgical treatment. Central tears with positive UV or signs of ulnocarpal abutment were reported to require ulnar shortening. However, some surgeons advised trying arthroscopic debridement or a wafer procedure first, to avoid the risks of an USO. This shows that decision-making in this context appears to be influenced by previous operative outcomes, (Szatmary et al., 2010), perceived risks (Tubbs et al., 2006) and technical difficulties associated with each treatment option. These findings support the suggestion by Watanabe et al. (2010) that surgeons may currently base their preference for a particular type of ulnar shortening procedure on their personal experiences and training, as published results are inconclusive (Constantine et al., 2000).

It is unclear whether clinically stable peripheral tears that do not respond to conservative management warrant either surgical repair (Reiter et al., 2008; Trumble et al., 1996; Wysocki et al., 2012; Yao and Lee, 2011) or debridement (Cardenas-Montemayor et al., 2013). This lack of agreement was noted in our participants and seemed to depend on individual perceptions of associated pain pathophysiology. Debridement was suggested to be reasonable for some partial tears and repair was recommended by participants who felt that peripheral tears without DRUJ instability may still cause pain, perhaps through inflammatory synovitis. This underlines the importance of understanding the underlying pathophysiological process and natural history of these tears.

The surgical repair of peripheral tears with DRUJ instability was well-accepted and reported by all participants in our dataset. However, a key question generated through this study, is the suitability of non-surgical management in DRUJ instability, especially given the unknown natural history of

this condition. Decision-making behind the management of DRUJ instability was related to perceptions of the natural course of the TFCC tear and whether chronic instability would lead to later degenerative disease. Although studies generally report successful outcomes for repair of unstable tears (Atzei, 2009; Atzei et al., 2015; Corso et al., 1997; Shih et al., 2002), the key question is whether repair is indicated if conservative management can resolve symptoms without long-term degenerative consequences. An important consideration in all the above cited studies is that they were unclear whether conservative management was trialled before surgery. Although evidence for the natural course of TFCC lesions is lacking, Mrkonjic et al. (2012) suggest that unstable TFCC tears sustained at the time of fracture of the distal radius do not lead to long-term subjective instability or degeneration. The controversy about the suitability of non-operative management in DRUJ instability is an important area for further investigation, as having an awareness of 'when not to operate' is essential to clinical practice (Spencer, 1979).

The importance of distinguishing relevant TFCC lesions from normal variants and incidental anomalies on MRI or during diagnostic arthroscopy (Chan et al., 2014) was reported in our dataset, highlighting the need to establish a working diagnosis through clinical assessment before further investigations. However, although most participants reported the use of similar clinical examination tests, their reproducibility, sensitivity and specificity are unknown.

Palmer's classification was deemed unhelpful in guiding TFCC management. It does not take DRUJ instability into account, a pivotal factor in the clinical decision-making process. Problems with misclassification were reported and inter-observer reliability is unknown. In particular, the misinterpretation of radial-sided 1A as 1D lesions may misguide management. 1D tears are peripheral and should be amenable to repair. Shih et al. (2002) showed good outcomes after repair of 1D lesions. However, reviews by Crosby and Greenberg (2015) and Ahn et al. (2006) suggest that either debridement or repair may be suitable for 1D tears. In view of participants' comments on the confusion in misdiagnosing radial-sided1A lesions as 1D, similar problems may arise when classifying such tears in studies, perhaps explaining the reported variation in the management of 1D tears in some papers. This highlights the need for a reproducible classification system.

As far as we know, this is the first study to address TFCC injury management through a qualitative interview approach. It explored the rationale behind clinical decision-making in TFCC management. The consolidated criteria for reporting qualitative research (COREQ) (Tong et al., 2007) were

followed. Nevertheless the study has some limitations. Had the interview series continued further, new themes might have arisen; however in this sample of ten, data saturation was achieved. Our sample was limited to England, potentially reducing the generalizability of the results. Qualitative research interviewers are the 'data collection tool' (Hansen, 2006); the impression made by the interviewer may affect interviewer-participant interactions (Richards and Emslie, 2000) and subsequent data analysis.

This study suggests that the natural history of TFCC injuries requires clarification to assess the role of current interventions. Given the complexities of diagnosis and classification highlighted, there would be many difficulties in carrying out a longitudinal study to clarify the natural history of traumatic TFCC tears. A simple, descriptive classification (which includes the status of DRUJ stability) is required to allow reproducibility and improve communication between researchers.

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Table 1. Search strategies.

Electronic database	Platform	Search terms
PubMed	OVID	"triangular fibrocartilage"[MeSH Terms] OR "triangular fibrocartilage" OR "triangular cartilage" OR "triangular fibrocartilaginous" OR TFCC
Embase	OVID	triangular fibrocartilage/ OR "triangular fibrocartilage" OR "triangular cartilage" OR "triangular fibrocartilaginous" OR TFCC
Cochrane Central Register of Controlled Trials (Cochrane CENTRAL)	Wiley	"triangular fibrocartilage" OR "triangular cartilage" OR "triangular fibrocartilaginous" OR TFCC

Table 2. Themes and sub-themes.

Themes	Sub-themes
Patient factors	Psychosocial issues: patient values and expectations
	Biological issues: age-related findings and co-existing pathology
Expert assessment	The role of clinical examinations and investigations
	Perceptions of pain pathophysiology
	The management of central lesions
	The management of peripheral lesions
Evidence base	Classification systems
	Published material versus experience
	Knowledge gaps/future research