The “Bowstring Arch Bridge” Analogy to Guide Sequential Portal Placement during Needle Aponeurotomy in the Treatment of Dupuytren Contracture

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Needle aponeurotomy is a minimally invasive surgical technique to correct Dupuytren contracture. Inadequate correction and inadvertent skin tears¹ could affect patient satisfaction following this procedure.

The author describes a unique analogy between the anatomical structures² encountered in a needle aponeurotomy and parts of a Bowstring Arch Bridge (► **Fig. 1**). This comparison helps understand the rationale of sequential portal placement to detension the chord at different levels and also helps plan ideal site of portal placement.

Needle aponeurotomy aims to achieve correction of Dupuytren contracture with minimal morbidity³ enabling early return of hand function following the procedure. Careful and sequential placement of needle portals during needle aponeurotomy is crucial in obtaining good correction and avoiding skin tears (► **Fig. 2**).

Dupuytren chords and nodules can be adhered superficially to the skin particularly at the skin creases. They can also be tethered to the deeper structures by vertical chords. Portals placed at skin creases are likely to tear due to chord–skin adherence.

Portals placed along the course of the Dupuytren chord on both sides of an adherent zone helps divide the chord proximal and distal to the adherent zone. This results in better detensioning of the chord and achieves a better correction. Additional portals can be planned if there is significant residual chord tension or if there is a potential

of developing a skin tear as the finger is stretched to full extension. In spiral chords, avoid placing needle

Fig. 1 Components of a Bowstring Arch Bridge and a comparative anatomy of Dupuytren contracture.

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Fig. 2 A single portal needle aponeurotomy in the palm may not be sufficient to detension the chord distally. This could result in excessive skin tension at the single portal site on manipulating the finger into extension and thereby cause a skin tear. This could be avoided by additional portals distally so that tension is distributed at the multiple portal sites. Furthermore, portals proximal and distal to adherent zones (skin creases, adherent nodules, vertical chords) help detension the chord on both sides of the adherent region.

Fig. 3 (A) Clinical photograph of Dupuytren contracture affecting the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints of the ring and middle fingers along with a thumb web contracture. Black "X" mark indicates the digits involved. Blue dots mark the course of the Dupuytren chords. Hash mark indicates the potential danger zone of digital nerve spiraling. (B) Full thumb web correction was achieved with a single portal. Biportal needle aponeurotomy of the ring and middle fingers resulted in full correction of the fingers with no skin tears. Portal sites marked with arrows.

portals in the area of digital nerve spiraling. This is a zone between the distal palmar crease and proximal finger crease (► **Fig. 3**).

The Bowstring Arch Bridge analogy is a useful concept in order to understand the rationale of sequential detensioning of the chord at multiple levels. This will result in a better correction without causing skin tears. This is a very simple and reliable concept to understand and apply in clinical practice.

References

- 1 Pess GM, Pess RM, Pess RA. Results of needle aponeurotomy for Dupuytren contracture in over 1,000 fingers. *J Hand Surg Am* 2012;37(4):651–656
- 2 Khashan M, Smitham PJ, Khan WS, Goddard NJ. Dupuytren's disease: review of the current literature. *Open Orthop J* 2011;5 (Suppl 2):283–288
- 3 Chen NC, Srinivasan RC, Shauver MJ, Chung KC. A systematic review of outcomes of fasciotomy, aponeurotomy, and collagenase treatments for Dupuytren's contracture. *Hand (NY)* 2011;6(3):250–255