

## Ideas and Innovations

# A technique for introducing looped sutures in flexor tendon repair

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### ABSTRACT

Stronger flexor tendon repairs facilitate early active motion therapy protocols. Core sutures using looped suture material provide 1 ½ to twice the strength of Kessler's technique (with four strand and six strand Tsuge technique respectively). The technique is well-described and uses preformed looped sutures (supramid). This is not available in many countries and we describe a technique whereby looped sutures can be introduced in flexor tendon repair by the use of 23 G hypodermic needle and conventional 4.0 or 5.0 sutures. This is an alternative when the custom made preformed sutures are not available. This can be practiced in zone 3 to zone 5 repairs. Technical difficulties limit its use in zone 2 repairs.

### KEY WORDS

Flexor tendon repair, modified looped suture

### INTRODUCTION

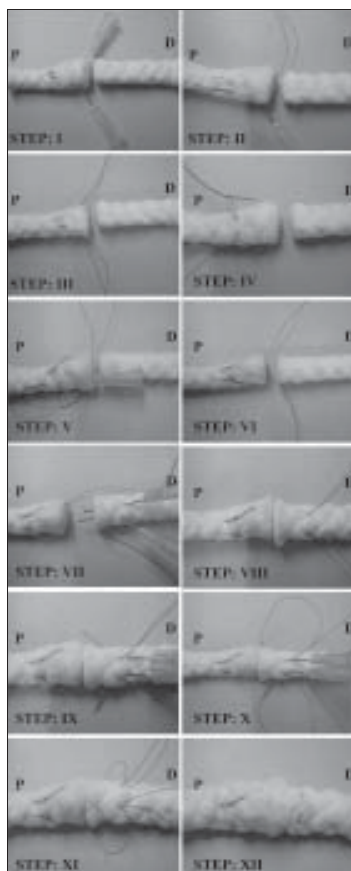
There are several techniques of flexor tenorrhaphy of the hand. The main objective of any technique is to make the tenorrhaphy as strong as possible for early active mobilisation of the fingers, which necessarily demands strong core sutures. One of the well known and time tested methods of providing stronger core stitches is by using method described by Tsuge<sup>[1]</sup> and later by Lim and Tsai<sup>[2]</sup> and its recent modification by Labana *et al.*<sup>[3]</sup> The method described by Labana *et al* though appears simple, involves supramid suture material with its looped version (S. Jackson Inc, Jackson USA). These suture materials are marketed only in few countries and are not yet available in India.

This motivated us to devise a new technique to bring about the same effect by using hypodermic needles. Hypodermic needles have been extensively used in

fracture fixation using stainless steel wires in the fractures of hand and facial bones. We are describing a method of tenorrhaphy using hypodermic needles for stronger core stitches.

### Technique

It involves obtaining 2 or 3 looped intra-tendinous stitches to provide 4 or 6 stranded core stitches. For the sake of simplicity and description the technique has been divided into twelve steps [Figure 1]. A 23-gauge hypodermic needle is bent to an angle of about 60-80 degrees. This bent needle is passed from posterolateral/posteromedial aspect of the proximal segment (P), about 1 cm from the cut margin and the tip brought out on the anterolateral/ anteromedial aspect (step 1). Now a 4/0 suture material without the needle is folded onto itself to make a loop at one end and the two free ends of the suture at the other. The two free ends are passed into the needle through its tip for a good distance, at least

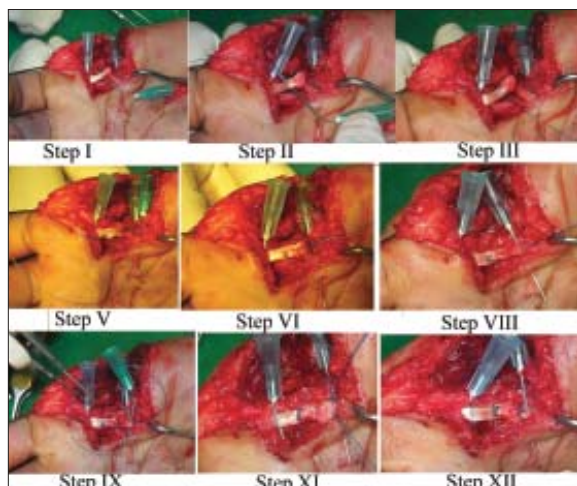


**Figure 1:** Laboratory photographs showing the steps of the suturing technique (step I - step XII) [refer text for details], dental roll has been used as the simulation for the tendon



**Figure 2:** Preoperative photograph of the clinical case. Pre-op photo

till the bend in the hypodermic needle so as to prevent them from slipping out while withdrawing the needle out (step II) (It is not necessary to bring the free ends are passed into the needle we will be left with a loop behind. Now the needle is withdrawn to bring the free ends out on the posterolateral aspect (step III). The free ends are



**Figure 3:** Intra operative photographs showing the steps of the suturing technique. Intra op case photo



**Figure 4:** Photographs showing the hand function four months postoperatively. Post op function

now passed through the loop to get a knot like effect at this end (step IV). A good amount of intervening tissue will make the hold stronger.

Now the same hypodermic needle is passed from the cut end of proximal segment of the tendon at the centre of its one half (lateral), so as to come out just proximal to the looped area. The free ends are now passed into the needle (step V) to deliver them at the cut surface of the tendon (step VI). If one desires, a third stitch can be applied posteriorly. At this stage the procedure is completed on the proximal segment of the cut tendon. At the distal segment (D), a hypodermic needle is passed from anterolateral/anteromedial aspect aimed to come out at the cut surface at the centre of lateral half of tendon (step VII). Both the free ends of the first core stitch are now passed through the tip and brought at the anterolateral surface of the tendon (step VIII). The

hypodermic needle is now passed from a point just away from this exit point of the suture material and brought out on the posterolateral/posteromedial aspect (step IX). At this stage only one single free end is delivered into the needle tip (step X), leaving the other free end behind and brought out over the anterolateral/anteromedial aspect (step XI). A knot is tied using the free ends of the suture materials (step XII).

This completes two double stranded core sutures, which has strength double than one conventional Kessler's suture.

If one desires to bury the knot, a small nick can be made using a No. 11 knife at the entry point of the needle (step VII), so that the final knot is buried into the substance of the tendon. Then a 6-0 inverted suture can be put to interiorise the knot in the substance of tendon so as to maintain a smooth gliding surface. Once two or three core stitches are applied, the surgeon can use any method of his choice for circumferential epitendinous stitches. Figures 2-4 depict a clinical example.

## DISCUSSION

Though we have clinically used the method described above for single and oligo- flexor tenorrhaphy of hand in zone III and zone V, we have found it technically difficult in zone II injuries to use hypodermic needles for passage of suture material because of lack of space and flexed position of fingers during repair. This method provides 1½ to twice the strength of Kessler's technique (with four strand and six strand Tsuge technique respectively)<sup>[3]</sup> and allows exteriorising the knot on the surface of the tendon rather than at the level of tendon repair. For each core stitch, we will have to pass free ends of the suture material through the needle four times. On first three occasions both the free ends will be passed into the needle and the fourth time only one free end will be

passed. Although it might appear tedious, it can be quite comfortably done when one is using a loupe magnification. A 23-gauge needle, which has a hole diameter of 0.4 mm, can easily accept a folded 4-0 or 5-0 prolene suture material which have a thickness of about 0.36 mm and 0.26 mm respectively (each 4-0 prolene has a diameter of 0.15-0.19 mm and each 5-0 prolene has a diameter of 0.12-0.16 mm).<sup>[4]</sup> The hypodermic needle does not cause more damage than the 4-0 or 5-0 needle as the difference in the diameter of the hypodermic needle and the maximum thickness of 4-0 and 5-0 needles is not very large [diameter of a 23 No. hypodermic needle is 0.6 mm and the maximum thickness of 4-0 and 5-0 needles is 0.5 mm and 0.4 mm respectively].<sup>[4]</sup> The trauma can be further minimized by taking care to always insert the needle with its bevelled surface facing straight up and enter the tendon between the longitudinally oriented fibres, rather than cutting across the fibres.

Although the suturing technique described herein appears a little tedious, it may even over score the commercially available looped sutures (if available) when the cost factor is considered. For putting each loop stitch one will require a pack of commercially available sutures, as the loop will be cut at the step VIII before tying the final knot. But with our technique with one 4-0 or 5-0 suture material we can easily put five or six sutures with looped configuration.

## REFERENCES

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