

# 흡수형 가시 봉합사를 이용한 손가락굴근힘줄 재건의 강도 Biomechanical Study of Absorbable Barbed Sutures in Flexor Tendon Repairs

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## 1. Introduction

Flexor tendon repairs continue to improve with advancements in suture technique and material [1-5]. Using nonabsorbable barbed suture for flexor tenorrhaphy methods have been reported and shown good results [3,5]. We hypothesized tendon repair with absorbable barbed Quill self-retaining suture (Angiotech, USA) is more ideal suture method than that of nonabsorbable barbed suture. The authors compared the outcomes of absorbable polydioxanone Quill barbed sutures versus absorbable or nonabsorbable unbarbed conventional techniques for flexor tendon repairs.

## 2. Materials and Methods

48 flexor tendons from the index, long, ring fingers of thawed fresh cadavers were harvested immediately before repair and performed tenorrhaphy using knotless two strand or four strand configurations with 2-0 absorbable polydioxanone Quill barbed sutures (Fig. 1), or unbarbed 3-0 PDS and unbarbed 2-0 Prolene two-strand or four-strand repairs (Table 1). To determine optimal unbarbed suture materials in control groups, we tested the strengths of each suture materials using universal test machine (5567, Instron, MA) about break load(N), extension(mm), and stiffness(N/mm). For unbarbed two strand control groups and four strand groups, modified Kessler and cruciate technique were used, respectively. Tendons were distracted to failure, and data regarding load at failure and mode of failure

were recorded by using Instron 5567 universal testing system.

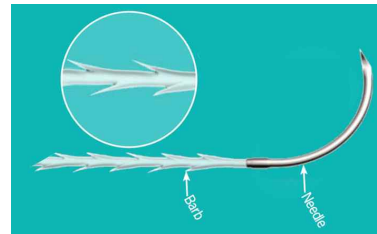


Fig. 1 Absorbable polydioxanone Quill barbed sutures

Table 1 Suture methods with barbed or unbarbed wire

	Barbed	Unbarbed
2 Strand		
4 Strand		

## 3. Results and Discussion

Mean load to failure of control group in two-strand repairs with 3-0 PDS and absorbable polydioxanone 2-0 Quill barbed sutures in two-strand repairs were 17.20±4.93N and 26.83±7.47N (P=0.007), respectively. Mean load to failure of control group in two-strand repairs with 2-0 Prolene was 22.35±5.72N whereas that of absorbable polydioxanone 2-0 Quill barbed sutures was 26.83±7.47N (P=0.25) (Fi. 2). Mean load to failure of control group in four strand repairs with 3-0 PDS and absorbable polydioxanone 2-0 Quill barbed sutures in four-strand repairs were 18.67±4.27N and 62.50±13.34N (P<0.001), respectively. Mean load

to failure of control group in four-strand repairs with Prolene 2-0 was  $21.96 \pm 6.78\text{N}$  whereas that of absorbable polydioxanone 2-0 Quill barbed sutures in four-strand repairs was  $62.50 \pm 13.34\text{N}$  ( $P < 0.001$ ) (Fig. 3).

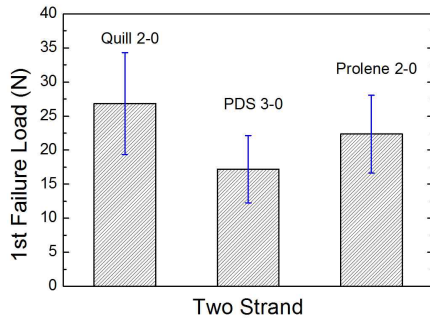


Fig. 2 Mean load to failure of two-strand repairs

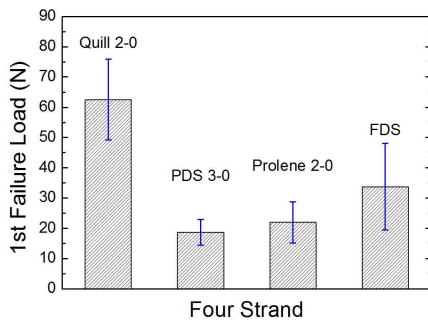


Fig. 3 Mean load to failure of four-strand repairs

#### 4. Conclusions

In fresh cadaver flexor tenorrhaphy, a two-strand 2-0 absorbable polydioxanone Quill barbed suture technique achieved tensile strength comparable to that of two-strand conventional 3-0 PDS and 2-0 Prolene repairs. A four-strand 2-0 absorbable polydioxanone Quill barbed suture technique demonstrated increased tensile strength compared with four-strand conventional 3-0 PDS and 2-0 Prolene. We expect that a tendon repair with 2-0 absorbable polydioxanone Quill barbed suture may be able to offer several advantages in flexor tenorrhaphy, and further in vivo testing will be required.

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