MENISCUS SUTURE WITH ABSORBABLE IMPLANTS

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SUMMARY

The authors clinically assessed 19 patients (19 knees – 15 medial meniscus and 5 lateral meniscus) submitted to meniscus suture using 2 kinds of absorbable implants (polylactic acid) Arrow® and Clear fix®. The study is composed of 15 males and 4 females, ages ranging 16 – 44 years old (average = 26.8 years old). The mean follow-up time was 24 months, ranging from 18 to 32 months, at most. The surgical technique was constituted of a suture in one or both meniscus (1 case), through arthroscopy with Arrow® in 15 patients and Clear fix® in 4. From the 19 individuals, 6 were submitted to isolated meniscal suture, 11 combined to ACL reconstruction and 2 to ACL reconstruction with tibial valgusing osteotomy. The results were assessed according to physical examinations including the maneuvers of Appley and Mc Murray. Pre- and postoperative functional evaluation of the knee was performed using a modified Lysholm scale. All patients had negative meniscal maneuvers postoperatively. The average preoperative score according to Lysholm scale was 39.8 reaching 91.5 postoperatively. The authors conclude that the meniscus suture using absorbable implants has shown to be efficient so far, and that, technically, it is simpler than conventional suture.

Keywords: *Knee; Meniscus; Bioabsorbable implant; Polylactic acid.*

INTRODUCTION

Menisci play a major role in knee joint function, particularly on load conveyance, on joint congruence increase and resultant stability. Its absence may also be considered to promote fast joint degeneration [1].

Thomas Annandale has proven to be beyond his time when he first reported, in 1883, a meniscal injury suture[2]. King[3], conducted a study in dogs and identified that meniscectomy yielded degenerative changes. In 1948, in a pioneer study, Fairbank observed, by means of X-ray images, degenerative changes on knee joint space after meniscectomy[4]. In 1977, McGinty et al.[5] reported that partial meniscectomy, in spite of total meniscectomy, reduced clinical morbidity in the short and long term.

After a description of meniscal peripheral blood flow pattern from perimeniscal capillary plexus by Arnoczky[6], it was possible to explain differences in prognosis for central and peripheral meniscal injuries. Traditionally, meniscal repair techniques involve open or arthroscopic sutures. That procedure may be performed by means of "inside-out" [7,8], "outside-in"[9,10] or "all-inside" techniques. More recently, the arthroscopic meniscal repair using biodegradable implants started to be considered as an alternative in therapeutic arsenal [2,11,12, 13].

The purpose of this study is to assess clinical outcomes of individuals submitted to meniscal suture using absorbable implants.

CASE SERIES AND METHOD

Our case series is constituted of 19 patients (19 knees), 15 males and 4 females, submitted to 15 medial menisci sutures and 5 lateral sutures, performed by a single surgeon. Ages ranged from 16 to 44 years old, with average of 26.8 years. Minimum follow-up time was 24 months through 41 months maximum, with an average of 33 ± 5 months.

In only two occasions, meniscal injury was considered as acute (1 case with a 10-day evolution and another with 2 weeks) and all other injuries were chronic in nature, with more than 8-week evolution.

Criteria for patient selection in this study were: positive clinical signs for meniscal injury (McMurray sign) with or without anterior cruciate ligament injury, magnetic resonance image evidencing meniscal injury. Patients in whom suture was precluded have been excluded from this study.

Patients assigned to meniscal suture either associated to anterior cruciate ligament repair or not showed during surgical procedure an injury that could be identified on meniscal vascular zone (1/3 peripheral), provided meniscal injury did not present gross signs of degeneration, complex injury or double loops, or whenever an appropriate reduction was possible.

Surgical procedure was constituted of suture in one or both menisci (1 case - patient 9 on table 1), through arthroscopic view, all-inside technique, using two kinds of absorbable implants, according to material availability. In 16 cases, the implant used was the Arrow® and in the remaining cases, Clear fix® (Figure 1). Both implants are made of polylactic acid. From the 19 individuals, 6 were submitted to isolated meniscal suture, 11 combined with ACL reconstruction (patellar tendon: 7; flexors: 4), and 2 to ACL reconstruction with flexors simultaneously to tibial valgusing osteotomy during the same surgical procedure.

Study developed at the Orthopaedics and Traumatology Institute, USP Medical College

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Received in: 04/06/06; approved in: 05/23/06

Patients were clinically assessed, pre- and postoperatively, and at final endpoint, by Appley's and McMurray's maneuvers, which were considered as positive or negative. Functional pre- and postoperative assessment and the final knee assessment were performed by modified Lysholm scale (1985).

Postoperative rehabilitation protocol consisted of stimulation through active knee mobilization and quadriceps stretching exercises, starting from the first postoperative day. The patients wore crutches for 3 weeks, with 1/3 partial load allowed for the first week and 2/3 for the second one. No squatting or flexion above 120º was allowed for 6 weeks.

Sequential number	Age (years)	Gender	Follow-up time (months)	Meniscus	Kind of Implant	Combined Procedure	Lysholm Pre	Lysholm Post
1	26	M	28	M	A	PT	44	90
2	44	F	40	M	A	ST	20	89
3	35	M	37	M	A		27	89
4	17	M	35	M	C		55	99
5	17	M	24	M	C	PT	76	100
6	16	M	39	L	A		42	92
7	26	M	34	M	A		31	94
8	37	M	24	M	C	PT	23	91
9	31	F	26	M+L	A	ST	38	91
10	24	M	29	M	A	PT	39	94
11	25	M	41	M	A		41	89
12	36	M	34	L	A	STO	45	94
13	18	F	36	M	A	ST	39	100
14	27	M	32	M	A	PT	38	90
15	31	M	32	M	A	PT	43	72
16	18	F	32	L	A	ST	42	95
17	16	M	33	M	A		40	93
18	37	M	38	M	A	STO	54	100
19	28	M	34	L	A	PT	41	92

A: Arrow® ; C: Clearfix®; PT: patellar tendon; ST: gracile and semitendinous; STO : gracile semitendinous + tibial osteotomy

Table 1 – *Material and Lysholm scale results*

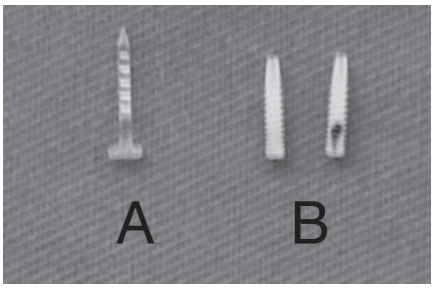

Figure 1 - *A) Absorbable implant, Arrow® type, and B) absorbable implant, Clear-fix®type.*

RESULTS

All individuals showed negative meniscal maneuvers postoperatively. Preoperative scores ranged from 20 to 76, with an average of 40.95. The average postoperative score was 92.32, ranging from 72 to 100 (table 1). In 2 individuals (patients 6 and 7), after an asymptomatic period, required arthroscopy for partial meniscectomy due to joint blockage within 12 and 6 months postoperatively, respectively. In patient ' occurred a patellar fracture after 9 months of ligament reconstruction, which was addressed by osteosynthesis. During evaluation, the meniscus presented with a good appearance. One arthrofibrosis case occurred to patient 15, who was submitted to arthroscopic release and manipulation. The arthroscopic view, in that case, showed a sutured meniscus with proper stable appearance. In patient 18, a suture dehiscence occurred at the osteotomy level, performed in conjunction with ligament reconstruction, which evolved satisfactorily with conservative treatment.

DISCUSSION

For decades, meniscectomy has been advocated by important authors, such as Smille[14], Dandy and Jackson[15]. With a better knowledge of biomechanics, meniscus function started being deeply studied and known. Since the study by Arnoczky[6] on meniscal peripheral vascularization, uncountable studies on meniscal suture started to be published. Today, there is a consensus towards the extreme importance of sparing meniscus for the sake of knee joint.

Recent advancements have been occurred on meniscal repair involving the all-inside technique. Traditionally, inside-out and outside-in techniques require additional incisions, extending surgical time, and sutures are often performed near to neurovascular structures[16]. Maybe those factors associated to the importance of menisci have encouraged the development of currently available implants, making the procedure easier and no longer requiring additional incisions.

Albrecht-Olsen et al.[2] were the first to introduce meniscal injuries fixation by means of biodegradable implants made of polylactic acid. Those authors performed fixation in meniscal injuries with bucket-handle pattern and reported that the all-inside technique has the advantage of eliminating the need of a supplemental knee posterior incision, reducing or eliminating the risk of neurovascular injury, as well as of facilitating and reducing surgical time[17]. Although this has not been object to our study, we believe that the use of absorbable implants with the all-inside technique reduces surgical time and postoperative morbidity.

Anderson et al.[18] reported that the clinical and arthroscopic evaluation of such cases are limited and their results are difficult to be determined. We agree with those authors in what concerns to results evaluation, especially because most of patients present combined procedures, which makes difficult to report a smooth study. Due to the small number of acute cases (only 2), it was not possible to perform a comparative analysis between these cases and those with chronic evolution.

Implants like Bionx Meniscus Arrow® type are supplied with three standard lengths (10, 13, and 16 mm) and may remain non-reabsorbable by hydrolysis at joint for a period of up to one year, without causing any inflammatory response [19]. They are made of crystalline polylactic acid, with satisfactory mechanical properties, high biocompatibility and extended degradation time, potentially lasting for many years [20]. Fixation resistance provided by those implants is comparable to that provided by repair with horizontal sutures [11, 21].

Menche et al.[19] described for the first time a case of meniscal repair failure due to inflammatory response to the kind of foreign body of the implant, and Anderson et al.[18], described a case of chondral injury caused by an implant. Whitman et

al.[16] reported that 31% of patients complained about pain at the posterior region of the knee after using absorbable implants (Biosciense, Tampere, Finland). Symptoms spontaneously disappeared within 4 to 6 months postoperatively and were not related to implant's length. Despite of those reports found in literature and of the fact that we had not performed any arthroscopic review ("second look"), our sample did not clinically show the complications described above. As a complication, we had two patients who, after an asymptomatic period, required a new arthroscopy for partial meniscectomy due to a joint blockage. Both patients were submitted to suture alone (without ligament reconstruction) with Arrow®. Re-surgery was performed within 7 - 12 months after suture, although the patients have been followed up for a longer time (cases 7 and 6 on table). There was no case of suture failure in patients submitted to combined surgery, which is consistent to findings by Jones et al.[22]. We didn't find an answer to that fact, but perhaps the intra-joint bleeding that occurs in a ligament reconstruction procedure might promote fibrin clots deposit, enabling suture healing. On the other hand, maybe isolated meniscal injuries in younger individuals occur in structures previously more fragile, which would favor new ruptures.

Our study contains 3 other complication cases, but these were not related to meniscal suture. One was simultaneously submitted to ACL reconstruction with PT evolving to arthrofibrosis, being performed an arthroscopy followed by knee manipulation 4 months after primary surgery. The suture had been performed with Arrow® at medial meniscus and this presented with no signs of significant injury. Another patient, also with ACL reconstruction with combined PT evolved to patellar fracture in 9 months postoperatively. We performed an osteosynthesis and the medial meniscus that had been previously sutured with Arrow®, presented with no significant changes (case 15 on table). And one case of suture dehiscence at osteotomy level evolved well with the establishment of conservative treatment. All those patients evolves satisfactorily regarding complications occurred. Those complications did not show, in our point of view, any relationship with meniscal suture performed, nor interfered on final outcomes.

According to literature, meniscal injuries repair failure rate ranges from 4% to 39%[1, 2, 11, 23, 24, 25]. Our study showed results consistent to those in literature, with a 10% failure rate, represented by 2 patients with suture alone, as previously described.

The satisfactory results achieved make meniscal suture with absorbable implants an integral part of the routine therapeutic arsenal for knee surgery, saving meniscectomy for those injuries in which that procedure is clearly unfeasible.

CONCLUSIONS

Meniscal suture in isolated injuries presents a higher loosing potential than those combined with ACL reconstruction.

Meniscal suture with absorbable implants should be considered as satisfactory from a clinical point of view.

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