Repair of Meniscal Tears by The All-Inside Polylactic Acid Meniscal Arrow

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The objective of meniscal repair is to prevent the early onset of osteoarthritis and alleviate the symptoms of a torn meniscus. In order to minimize the risk of neurovascular damage when repairing posterior and lateral horn tears of the meniscus, an all-inside arthroscopic surgical technique has been developed using a polylactic acid (PLA) tack as a bioabsorbable "meniscal arrow". This paper is a retrospective study that evaluates the efficacy of this technique. Post-operative evaluation was performed by chart review and surveys with respect to knee function (Lysholm Scale), activity level (Tegner Activity Scale), and patient quality of life (Medical Outcomes Survey, Short Form-36). Clinical evaluation showed that 12 of 13 patients had successful repair by this technique. Eight patients had normal range-of-motion (ROM), three were restricted, and two were unrecorded. Surveys were completed by 8 of the 13 patients. Six of eight survey respondents returned to pre-injury levels of sports activity. Mean scores of the eight survey respondents on the Short Form-36 showed slightly lower than average values for Physical Functioning (PF), Role-Physical (RP), and Bodily Pain (BP); however, General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scores were above average. All study values were within 1.0 SD of the norm. Quality of life did not appear to be affected. Seven of eight survey respondents reported slight impairment while squatting. The all-inside meniscal arrow repair technique was effective and appropriate in repairing meniscal tears of the knee. Unfortunately, difficulty in squatting and restriction of ROM are two sequelae that may occur post-operatively

INTRODUCTION

Basic Science of the Meniscus

The menisci are C-shaped fibrocartilaginous disks that were once thought to be functionless artifacts of intraarticular muscle attachments incapable of healing. The menisci are now known to play an integral part in the biomechanics of normal knee joint function. Knee menisci increase joint congruence, promote stability, and transmit load across the joint. Total meniscectomy has now been replaced by more conservative clinical treatment modalities (1-3).

Menisci distribute the load on articular surfaces due to their location and wedge-like shape. Meniscectomy causes a reduction in contact area, increased contact stress, and decreased joint stability. This leads to degenerative changes such as flattening of the femoral condyle, formation of bone cysts, joint space narrowing, and osteophyte formation—the hallmarks of osteoarthritis (4). Mechanical shocks due to loading of the knee joint are absorbed by the menisci due to their deformable nature, permeability to interstitial fluid, and bulk mass. The movement of interstitial fluid through menisci also provides lubrication of the articular surfaces. The shear modulus of the meniscus is one-tenth of the modulus for articular cartilage; thus providing congruity, load support, load distribution, and shock absorption between the tibial plateau and femoral condyles (5).

Orientation of the collagen fibers in the meniscus helps to withstand compression between the femoral condyles and the surface of the tibia. The compression applied onto the meniscus stretches the circumferential collagen fibrils. This generates a tensile stress across the meniscus' cross-section (6,7). Excessive compression of a meniscus leads to creation of radial cracks. Collagen fibers deflect the radial propagation path to

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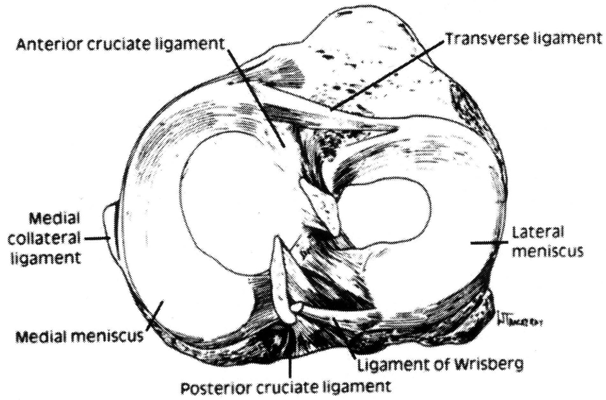

***Figure 1:** Drawing of the tibial plateau demonstrating the medial and lateral menisci (3).*

form a circumferential tear as long as the stress is maintained or re-introduced (Figure 2). This may propagate into the commonly observed vertical-longitudinal or "bucket-handle" tear (5). Figure 3 shows a bucket-handle tear of the meniscus as seen through an arthroscope.

Blood supply to the meniscus originates predominantly from the lateral and medial geniculate arteries giving rise to a perimeniscal capillary plexus within the synovial and capsular tissues. This capillary plexus supplies the peripheral border of the meniscus throughout its joint capsule attachment. Only the peripheral areas of the meniscus are vascular; the remaining central regions are avascular. Clinical observations demonstrate that the vascular periphery can produce a reparative response following an injury. Initially, inflammatory cells proliferate and migrate to the wound site forming a fibrin clot. The fibrin clot contains platelet-derived growth factor, fibronectin, and fibroblast growth factor. This produces proliferating undifferentiated mesenchymal cells and angiogenesis originating from the peripheral meniscus, forming fibrovascular scar tissue that eventually modifies into fibrocartilage. This is the rationale that justifies repairing a meniscal tear in the vascular region (2).

All-Inside Meniscal Arrow Repair Technique

An all-inside meniscal repair technique has been developed using a polylactic acid (PLA) tack as a bioabsorbable "meniscal arrow". This technique is less technically demanding than the standard "all-inside" technique, does not require a posterior operative cannula (thus removing the possibility of damaging neurovascular structures), reduces operative time for repair of meniscal tears, and can be used throughout the meniscus—specifically tears of the posterior and lateral horns of the meniscus. The meniscal arrow is a T-shaped arrow with scales like the barbs of a fishing hook. It is made of PLA, a biodegradable material. The stem diameter of the arrow is 1.1 mm with a T-handle, and it is available in 10 to 16 mm lengths. The stem penetrates the meniscus, and the scales prevent the arrow from backing out as they are caught by the semicircular fibers of the peripheral meniscus and synovial capsule. The T-handle opposes the inner, loose portion of the meniscal tear and keeps it in proximity to the periphery. Meniscal arrow application is facilitated by one of several cannulae. A blunt obturator is used to introduce the cannula into the knee, a cutting needle instrument is used to prepare a hole in the meniscus for the arrow, and either a pneumatic reciprocator or a mallet is used to shoot the arrow into the meniscus (8,9). Figure 4 shows an arthroscopic photograph of a bucket-handle tear that has been repaired with the meniscal arrow.

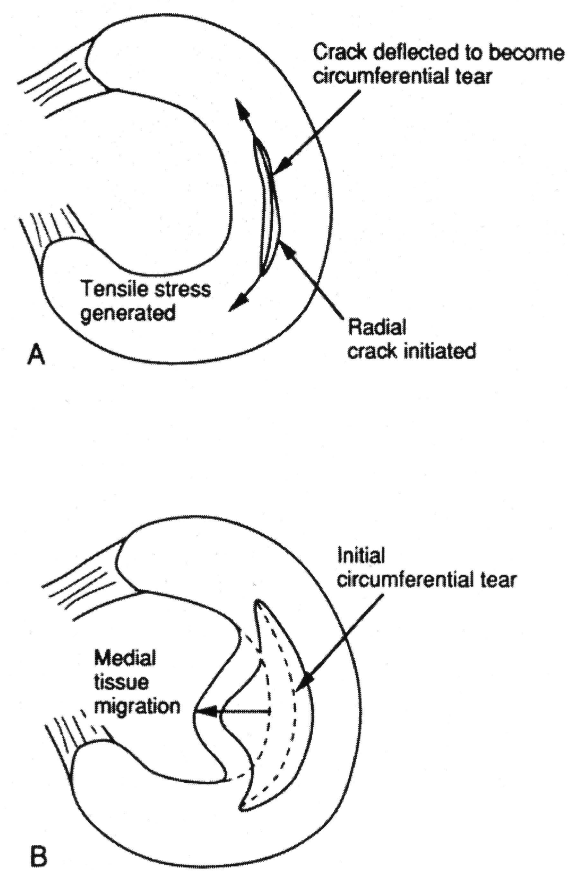

***Figure 2:** Diagram (view is from above) showing A. the formation of a circumferential tear in the menisci and B. its development in to a "bucket-handle" tear (5).*

This paper is a retrospective study that evaluates the efficacy of the meniscal arrow in the repair of meniscal tears. The paper also relates the results of the repair technique to postoperative knee function, activity level, and quality of life.

METHODS

Chart Review

A retrospective chart review was performed on patients who underwent meniscal repair with the Bionx Meniscal Arrows in 1998. Repair technique was documented as well as tear location, type of tear, associated injury, and final range-of-motion (ROM). Success of the repair was based on three criteria: the arrows properly held the meniscus in place during the repair; the meniscus healed properly (based on postoperative clinical evaluations); and postoperative meniscectomy was not required.

Surveys

Surveys consisted of the Lysholm Knee Survey, the Tegner Activity Survey, and the Medical Outcomes Trust Short-Form 36 Health Survey. The surveys also included questions regarding the specifics of the injury, level of sports activity pre- and post- injury, rehabilitation protocol, and the current use of a brace.

The Lysholm knee scoring scale was originally designed for post-operative evaluation of function and instability following knee ligament surgery. This scoring scale is symptom related and grades the patient's knee based on the presence of a limp, type of support required, locking, instability, pain, swelling, stair-climbing, and squatting, and it establishes the patient's knee function in daily activity (10). The Tegner activity scale is a numerical grading of the patient's activity level on a scale from 0-10. The Tegner activity scale complements the Lysholm knee score; patients with high levels of activity usually present with more symptoms and lower Lysholm scores than patients with low levels of activity (11,12). The Short-Form 36 (SF-36) is a 36 item short-form questionnaire designed for use in clinical practice and research, health policy evaluations, and general population surveys. The survey is based on the patient's perspective in monitoring personal health, and it is an evaluation of function and quality of life. Individual survey results are compared to the standardized values derived from representative surveys of the general population during the Medical Outcomes Study (MOS) (13). From Ware and Sherbourne (14):

The SF-36 includes multi-item scales assessing eight health concepts:

1.Limitations in physical activities because of health problems;
2.Limitations in social activities because of physical or emotional problems;
3.Limitations in usual role activities because of physical health problems;
4.Bodily pain;
5.General mental health (psychological distress and well-being);
6.Limitations in usual role activities because of emo tional problems;
7.Vitality (energy and fatigue); and
8.General health perceptions.

RESULTS

Chart Review

Thirteen patients underwent repair of meniscal tears with the meniscal arrow (Table 1). The age at time of operation ranged from 13-33 years old (median: 16). There were 6 female patients and 7 male patients. Four patients had a concomitant anterior cruciate ligament (ACL) tear. There were 6 bucket-handle tears and 7 non-bucket-handle tears. Six tears were in the medial and 7 were in the lateral meniscus. One of the 7 lateral tears and all 6 medial tears required a combination repair using the all-inside arrow repair technique and the inside-out vertical loop suture repair technique. Six of the 7 lateral tears were repaired by the all-inside arrow technique only. The all-inside arrow repairs were used to repair tears of the posterior and lateral horns, while the inside-out vertical loop sutures were used to repair anterior horn tears. Eight patients had normal ROM following rehabilitation; this was based on physiotherapy reports. Three patients had restricted ROM after rehabilitation, while two patients had no physiotherapy records available for determination of ROM.

Two of the 13 patients (Patients 7 and 12) had complications during the time from their initial surgery to the time of survey response. One patient (Patient 3) had a failed repair 2 months after responding to the surveys—11 months fol-

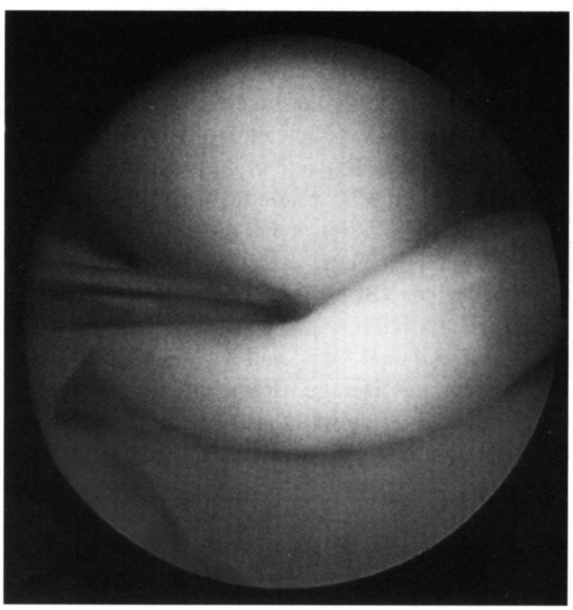

***Figure 3*:** Bucket-handle tear of the meniscus as viewed through an arthroscope.

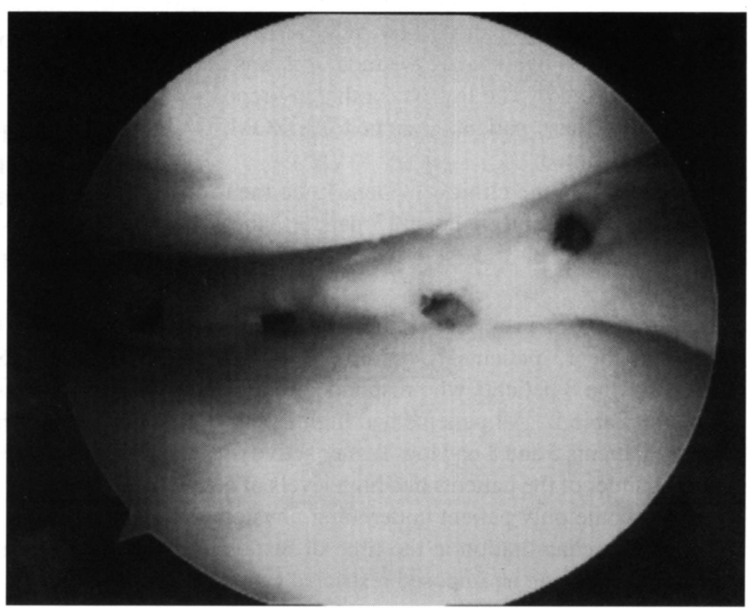

***Figure 4*:** Arthroscopic photograph of a bucket-handle tear repaired with meniscal arrows. The tops of the arrows' T-handles are seen embedded in the meniscus.

Table 1 - Summary of Chart Review Results

Pt #	Affected Meniscus	Type of Tear	Repair	Technique	ROM Associated Injury
1	Lateral	Non-Bucket-Handle	All-In	No record	
2	Medial	Bucket-Handle	All-In + In-Out	Normal	Previous MCL tear
3*	Lateral	Bucket-Handle	All-In + In-Out	No record	Anterior capsule torn
4	Medial	Non-Bucket-Handle	All-In + In-Out	Normal	ACL deficiency
5	Medial	Bucket-Handle	All-In + In-Out	Normal	ACL deficiency
6	Medial	Bucket-Handle	All-In + In-Out	Normal	
7	Medial	Bucket-Handle	All-In + In-Out	Normal	
8	Lateral	Non-Bucket-Handle	All-In	Restricted	Partial ACL tear
9	Lateral	Non-Bucket-Handle	All-In	Restricted	Partial ACL tear
10	Medial	Bucket-Handle	All-In + In-Out	Restricted	ACL deficiency
11	Lateral	Non-Bucket-Handle	All-In	Normal	
12	Lateral	Non-Bucket-Handle	All-In	Normal	
13	Lateral	Non-Bucket-Handle	All-In	Normal	ACL deficiency

* Patient 3 had the only failed repair.

lowing the original surgery. Patient 7 complained of severe inflammatory pain in her knee. She underwent a second-look arthroscopy that showed a healed meniscus with inflammation of the synovium; this eventually resolved. Patient 12 developed hemarthrosis of the knee after hyperflexing his knee several months after the initial surgery. Second-look arthroscopy showed one of the arrows was loose and partially dissolved, but the lateral meniscus was stable and healed. Patient 3 had a successful recovery when he responded to the surveys; however, two months later, he re-injured his knee. Second-look arthroscopy showed that his meniscus was re-torn in the posterior and lateral horns, but his anterior horn was still intact.

Four other patients also underwent second-look arthroscopy due to repair of their ACL 6-9 weeks after the meniscal repair. In all cases, the meniscus was found to be stable and healed. The last physiotherapy reports showed that three of these patients regained full ROM, while one was still restricted.

Based on the clinical evidence, the meniscal arrow repair was successful in 12 of 13 patients: the only failed repair being Patient 3.

Lysholm Knee Survey Scores and Tegner Activity Levels

Of the 13 patients, 5 were lost to follow up. The results for the 8 patients who responded to the surveys are shown in Table 2. All patients had high Lysholm function scores. Patients 5 and 8 had low Tegner activity levels while the remainder of the patients had high levels of activity. Patient 1 was the only patient undergoing physiotherapy and progressive rehabilitation at the time of responding to the survey; thus having an imposed restricted activity level.

Medical Outcomes Study Short-Form 36

The results of the SF-36 survey for the eight patients followed up are shown in Table 3. Table 4 shows the difference in standard deviations between each patient's SF-36 result and the normal values obtained by the Medical Outcomes Survey (MOS) SF-36 in the United States. Each individual patient's score has been matched to his or her most representative population based on age and sex. Positive values reflect more desirable health.

Only two values lie outside 2.0 standard deviations (SD) from the norm. Patient 1 is below the U.S. general population in Role-Physical (-4.4 SD), while Patient 2 is below the norm in Physical Functioning (-4.5 SD). The comparison of the mean values for all eight patients is close to that of the mean for the U.S. general population; however there is a slight upward gradient along the continuum from left to right (Figure 5).

The mean values of the eight patients' SF-36 scores show close correlation to the average for the U.S. general population (Figure 5). All current study values were within 1.0 SD of the norm. The left side of the bar graph reflects physical health while the right side reflects mental health. The bar graph in Figure 5 shows that the eight patients had slightly lower Physical Functioning (PF), Role-Physical (RP), and Bodily Pain (BP) scores than the average; however, General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH) scores were above the average. Reviewing the responses for physical functioning showed that 7 of 8 respondents recorded some limitations with bending, kneeling, or stooping.

General Survey Questions

Of the eight respondents, there were no previous knee surgeries in past medical history. Patients 2 (partial medial collateral ligament (MCL) tear two months prior) and 7 (patellofemoral syndrome) were the only patients with past medical history for knee problems. Patients 5 and 8 experienced a reduction in current levels of sports activity compared to pre-injury levels; all other patients maintained their levels of sports activity. All eight respondents attended physiotherapy and performed rehabilitation programs at home. Three patients (2, 4, and 7) currently wear knee braces when playing sports. There was no correlation between the occurrence of the injury with the time during the sporting event; the injuries occurred equally during the early, middle, and late stages of the event. Seven of 8 patients reported slight impairment with squatting.

DISCUSSION

Chart Review

The limited movement of the posterior horn of the medial meniscus increases its risk for tearing, while the greater movement allowed to the lateral meniscus accounts for its decreased risk of a tear (15). In this study, there were more lateral meniscal tears than medial (seven lateral, six medial); this may be due to our relatively small sample size. Tears of the medial meniscus are usually more severe than those of the lateral. All six medial tears were severe: requiring both the all-inside arrow repair technique and the inside-out vertical loop suture repair technique as the anterior horns of the meniscus were also torn. Conversely, the lateral tears were less severe as only one of the seven (Patient 3) had an anterior horn tear.

Eight patients had normal ROM, three had restricted ROM, and two patients did not have their ROM recorded. Unfortunately, the charts could not supply further information on ROM, so some of the patients who were last reported to have restricted ROM may have improved later. Three of the four patients who required ACL reconstruction regained full ROM. A possible explanation is that the ACL tear may create a better healing environment for the meniscus due to the increased blood in the synovium. Another explanation is the rehabilitation protocol used for ACL repairs immobilizes the knee, thus facilitating improved healing. A combination of both of these working in synergy may also be an explanation.

As expected, all meniscal tears involved at least the posterior horn of either the medial or lateral meniscus. The posterior and lateral horns are more easily accessible by the all-inside meniscal arrow repair technique; this reduces the risk of damage to neurovascular structures. Patients 2-7 and 10 had severe meniscal tears that also involved the anterior horn of the meniscus. In these patients, both the all-inside meniscal arrow and the inside-out vertical loop suture tech-

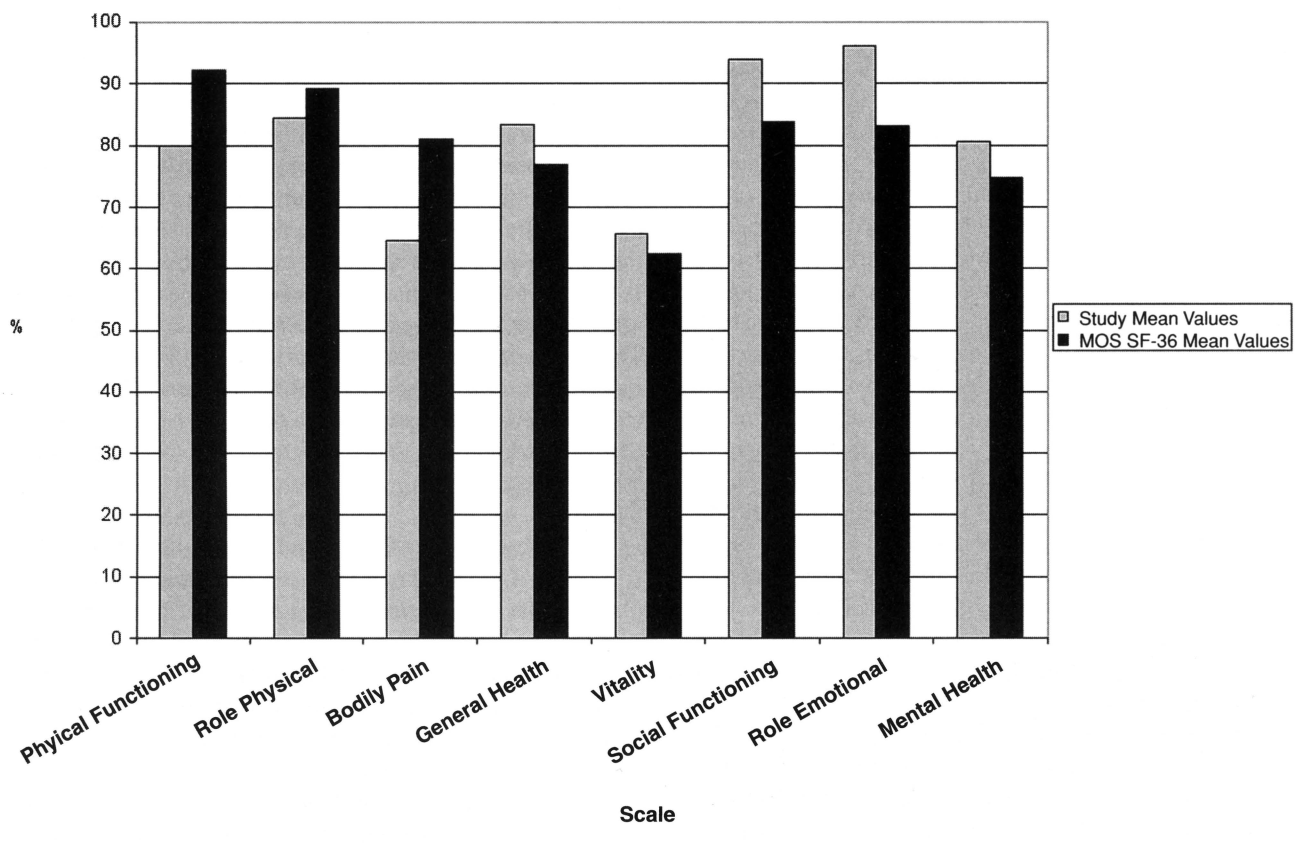

Figure 5: Comparison profile of the SF-36 survey results.
Comparison of our study patients' means to those of the MOS SF-36 health survey.

Table 2 - Summary of Lysholm Knee Scores and Tegner Activity Levels

Patient #	Postoperative time (weeks)	Lysholm Knee Score (max = 100)	Tegner Activity level (0-10)
1*	10	86	6
2	36	83	10
3**	34	99	9
4	48	78	7
5	38	92	3
6	46	89	7
7	50	94	10
8	54	94	4

* Patient 1 was currently undergoing physiotherapy and had imposed restricted activity.
** Patient 3's repair failed 2 months after responding to the surveys.

niques were employed. The meniscal arrow was used on the posterior and lateral horn tears because of the reduced risk of damage to neurovascular structures, and it was technically less demanding to place the meniscal arrows in this region. The inside-out vertical loop suture technique was used for the anterior horn tears since the risk of damaging neurovascular structures was the same as the arrow, the technical demand for placing vertical loop sutures was the same as the arrow, and the vertical loop sutures had a stronger fixation strength.

Albrecht-Olsen et al. (1997) concluded that there was no statistically significant difference in failure load between horizontal sutures and the meniscal arrow (16). However, a vertical loop suture is the gold standard for initial fixation strength of meniscal tears; this is due to the semicircular orientation of the fibers in the meniscus. Dervin et al. (1997) showed that vertical loop sutures had 2 times greater fixation strength than the PLA Biofix Meniscal Arrows. Also, the arrows allowed gapping of the torn meniscus. Gapping is a consequence of an obligatory strain required before the barbs of the arrow can grab sufficient meniscal tissue to resist displacement. Gapping is a potential concern as this could impair the healing process due to lack of contact (17). Preliminary studies (9,18) and our results show that the meniscal arrow works as well as, if not better than, standard meniscal repairs for tears of the posterior and lateral horns. Therefore, the meniscal arrow, while only having one-half the fixation strength of vertical loop sutures, has adequate fixation strength to allow the meniscal repair process to function post-operatively during rehabilitation. It is also duly noted that immediate immobilization of the knee post-operatively is important to prevent gapping.

Patient 3 was the only repair that failed. This patient had the most severe tear of all the patients in our study: a bucket-handle tear of the lateral meniscus that included the anterior horn and the anterior capsule of the knee. The meniscus was originally repaired using the all-inside meniscal arrow technique for the posterior and lateral horns and the inside-out vertical loop suture technique for the anterior horn. Eleven months after surgery, the posterior and lateral horns were re-torn, but the anterior horn was still held intact by the vertical loop sutures. It is possible that the mobility of the lateral meniscus increases its risk for re-tearing as compared to the more stationary medial meniscus; however, a study involving larger numbers would be required to test this hypothesis.

There is evidence to suggest that PLA bone fixation rods, which are larger than the PLA meniscal arrows, may induce an immune response within the knee joint when used to fixate bone intraarticularly (19-21), and this may have occurred in Patient 7 of our study. However, there have been no documented reports of post-operative inflammation in meniscal repairs using PLA meniscal arrows. Albrecht-Olsen, Kristensen, and Tormala (1993) suggested that the immune response may be linked to the coloring previously used in the PLA Bone fixation rods; that is why they have not colored the PLA meniscal arrows (8). Another hypothesis may be that the immune response is dependent on a dose-response relationship; PLA bone fixation rods have a larger diameter (2 mm) and are used in greater numbers than the PLA meniscal arrows. This increased "dosage" may account for the presence of inflammation, whereas the smaller dosage of meniscal arrows would not initiate inflammation. Although there have been no known cases of Biofix/Bionx PLA meniscal arrows inducing an immune response, we should be aware of this possibility.

Based on the clinical evidence, the all-inside meniscal arrow repair technique was successful in 12 of 13 patients. This study supports the appropriateness of the all-inside meniscal arrow repair technique for posterior and lateral horn tears; however, some patients may develop a functional loss of ROM which is a regular occurrence following most meniscal repairs.

Lysholm Knee Survey Scores and Tegner Activity Levels

The Lysholm knee score is a symptom-related score that provides information on knee function. The more often symptoms occur, the lower the score will be; however, symptoms can be affected by activity level (11,12). Patients with high Lysholm scores and Tegner activity levels (Patients 2, 3, 4, 6, and 7) have better function than patients with a high Lysholm score and a low Tegner activity level (Patients 1, 5, and 8). However, irrelevant factors such as social or economic advantages or disadvantages must be considered as biases when patients have low levels of sports activity, and this most likely explains the low Tegner activity levels in Patients 5 and 8. Patient 5 was a sedentary, non-athletic teen-

Table 3 - Current Study SF-36 Survey Results

Pt	PF	RP	BP	GH	VT	SF	RE	MH
1	85%	0%	42%	97%	50%	63%	100%	56%
2	20%	100%	74%	72%	65%	88%	100%	76%
3*	95%	100%	72%	95%	65%	100%	100%	92%
4	90%	75%	72%	67%	85%	100%	67%	84%
5	80%	100%	62%	77%	70%	100%	100%	80%
6	90%	100%	72%	100%	80%	100%	100%	92%
7	95%	100%	51%	87%	30%	100%	100%	84%
8	85%	100%	72%	72%	80%	100%	100%	80%
Mean	80.0%	84.4%	64.6%	83.4%	65.6%	93.8%	96.0%	80.5%

PF = Physical Functioning; RP = Role Physical; BP = Bodily Pain; GH = General Health; VT = Vitality; SF = Social Functioning; RE = Role Emotional; MH = Mental Health
Higher values represent better health.
* Patient 3's repair failed 2 months after responding to the surveys.

ager who maintained a low activity level after surgery. Patient 8 was a 33 year old male who changed his occupation and subsequently had less time for athletic activities. The lowered activity level in Patient 1 was due to the fact that he was only 10 weeks post-surgery and had physiotherapy imposed restricted activity.

Medical Outcomes Study Short-Form 36

Results from Table 5 show that Patients 1 (-4.4 SD for Role Physical) and 2 (-4.5 SD for Physical Functioning) were >2.0 standard deviations below the averages for the U.S. general population. The low score from Patient 1 was probably due to his short post-operative time when answering the survey (10 weeks). He was still undergoing physiotherapy and had yet to fully recover from surgery. Patient 2 was an elite-level athlete who suffered a bucket-handle tear of his medial meniscus. Two months prior to this, he partially tore his MCL. Post-operatively he was able to achieve his pre-injury level of sports activity; however, it appears that his physical functioning was not as prolific as it was prior to both injuries. Clinically, Patient 2 had a successful meniscal repair, but his physical function may be hampered by his MCL injury and meniscal tear.

The SF-36 profile orders scales from left to right in a continuum from the best physical health measure (PF = Physical Functioning) on the left, to the best mental health measure (MH = Mental Health) on the right. Therefore, differences on the left side of the profile reflect physical health status; differences on the right side reflect mental health status. The upward gradient along the continuum from left to right (Figure 5) may be explained by the fact that these patients were young and athletic. The knee injuries sustained were physical setbacks causing problems in physical well being. The patients' mental states, however, were strong since recovering from surgery and rehabilitation.

Reviewing the individual survey responses showed that 7 of 8 respondents recorded some limitations with bending, kneeling, or stooping. This was also expressed in the general survey questions where 7 of 8 patients reported slight impairment with squatting. In most patients with severe meniscal tears, this is a common outcome following successful surgical repair. As the knee hyperflexes, the meniscus provides stability by remaining in constant congruence to the articular surfaces of the tibia and femur throughout flexion and extension (15). A surgically repaired meniscus has decreased translation in the plane between the tibial plateau and the femoral condyles. Thus, congruency is reduced during flexion, and the amount of flexion while weightbearing (i.e. squatting) is limited.

CONCLUSIONS

The all-inside meniscal arrow repair technique has been shown to be both effective and appropriate in repairing posterior and lateral horn tears of the meniscus. Clinical evaluation showed that 12 of 13 patients had successful repair by this technique, although only 8 patients were confirmed to have normal ROM. Quality of life did not appear to be affected. The meniscal arrow's strength is roughly one-half of vertical loop sutures, but it has adequate fixation strength to allow the meniscal repair process to function post-operatively during rehabilitation. Immediate immobilization of the knee post-operatively is recommended to prevent gapping of the tear from occurring. Although there have been no known cases of Biofix/Bionx PLA meniscal arrows inducing an immune response, we should be aware of this possibility for future cases.

The objective of surgical repair is to preserve as much of the meniscus as possible—to prevent the early onset of osteoarthritis—and to alleviate the symptoms of having a

Table 4 - Standard Deviations of Current Study SF-36 from General U.S. Population.

Pt	PF	RP	BP	GH	VT	SF	RE	MH
1	-0.5	**-4.4***	-1.8	+1.1	-0.8	-1.2	+0.5	-1.4
2	**-4.5***	+0.3	-0.3	-0.3	-0.8	+0.1	0	-0.1
3**	+0.1	+0.3	-0.3	+1.0	0	+0.7	+0.5	+0.9
4	-0.3	-0.9	-0.4	-0.6	+1.0	+0.7	-0.8	+0.4
5	-0.5	+0.5	-0.9	0	+0.5	+0.9	+0.6	+0.4
6	0	+0.5	-0.4	+1.5	+1.1	+0.7	+0.6	+1.0
7	+0.2	+0.5	-1.5	+0.6	-1.5	+0.9	+0.6	+0.6
8	-0.9	+0.4	-0.6	-0.4	+0.8	+0.7	+0.6	+0.3

* Values > 2.0 Standard Deviations from the norm.
** Patient 3's repair failed 2 months after responding to the surveys.

torn meniscus: pain, swelling, locking, and catching. Unfortunately, difficulty in squatting and restriction of ROM are two sequelae that may occur post-operatively.

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