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Procedures applied in the treatment of chronic anterior knee instabilities and our results

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Kronik anterior diz instabilitesi tedavisinde kullanılan yöntemler ve sonuçlarımız

1980-1990 yılları arasında Gülhane Askeri Tıp Akademisi Ortopedi Servisi'nde 135 ön çapraz bağ yetmezliği olan hasta, Ellison, Modifiye Marshall teknikleri ve Dacron sentetik proteziyle tedavi edildi.

Modifiye Marshall tekniği anteromedial instabilitelerinin tedavisinde, pes anserinoplastinin uygulandığı, vastus medialisin öne ve distale çekildiği m. sartorius'un öne transferi tekniğiyle beraber yapılmıştır. Bu grupta başarı oranı % 83'tür, 2 1/2 yıl takibin ardından dacron protezde başarı oranı % 85'tir.

Anahtar kelimeler: *Diz instabilitesi, kombine Marshall tekniği*

Between 1980 and 1990, 135 patients with anterior cruciate insufficiency were treated by Ellison, Modified Marshall techniques and Dacron synthetic prosthesis in Orthopeadics Department of Gülhane Military Medical Academy.Modified Marshall technique is used in the treatment of anteromedial instabilities in addition to the technique of anterior transfer of m. sartorius, retracting the vastus medialis anteriorly and distally, and pes anserinoplasty are applied. The success rate of this group was 83%. After 2, 5 year follow-up, the success rate was 85% in dacron prosthesis.

Key words: *Knee instability, combined Marshall technique*

The knee, which is the most functional joint of the lower extremity, is prone to all sorts of injuries such as sports and trauma.

The range of injuries change from a simple soft tissue injury to the rupture of the cruciates, meniscus and capsule tears.

As a results, we saw that the instability, resulted as functional deficiency in the knee, is related to the direction, duration and the power of the injury and also to the dynamic and static position of the knee at that time. It is necessary to define the type of the instability to determine the way of treatment and postoperatif rehabilitation program (4, 7).

The classification of the Amerian Orthopaedic Association which depends on the tibial sliding according to the femur in stress tests is as follows (6, 14):

A. Simple or one-plane instability
- Simple medial instability
- Simple lateral instability
- Simple anterior instability
- Simple posterior instability

B. Rotatory instability
- Anteromedial instability
- Anterolateral instability
- Posteromedial instability
- Posterolateral instabilty

C. Combined instability
- Anterolateral-posterolateral
- Anterolateral-anteromedial
- Anteromedial-posterior

Another classifition offored by the American Sports Medicine Association is related to the instability. The distance between the joint surfaces is the basic issue of this classification (2, 6, 14).

According to this classification:

a. Grade I: Less than 5 mm widening of the joint surfaces

b. Grade II: Between 5-10 mm widening

c. Grade III: More than 10 mm widening of the joint surfaces.

The mechanism of the injury makes a complex event. Mostly seen mechanism is the abduction, flexion and internal rotation of the femur on the tibia (anteromedial instability) or anterior sliding of the lateral tibial plateau (anterolateral instabilty).

Material and method

Between 1980-90, 135 cases with simple or rotatory anterior instability were treated in Orthohaedics Department of Gülhane M. M. A. and M. F. The age range of the patients were between 20 and 35 (mean 23. 5) 127 cases were male and 8 were female. Tra-

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uma was the first reason of these instabilities. 25% of this was sports injuries. Patients complaints were; giving, way swelling, locking and crepitation. Procedures we follow before making a diagnose (7, 12, 14):

I. History

Complain, the way of the trauma, duration, applied treatment

II. Physical examination
- Anterior drawer
- Slocum's rotatory instability test
- Varus and valgus stress
- Knee jerk test

III. Radiography (Instability is classified according to the stress test)

IV. Artrography

V. Measurement with artrometer

VI. Arthroscopy

Data about the procedure: The patients are classified according to the type instability and mater they are operated.

I. Modified Marshall:

55 patients with anteromedial instability were treated by this technique. Associated lesions were as follows.

Medial meniscus tear	23 (41. 8%)
Chondral defect	12 (21. 8%)
Loose body	2 (3. 6%)

Technique:

Tendinous stripped flap taken from the central portion of the patellar tendon is prepared with a thin osseous part on the patella. The flap prepared in ruloformation is passed through a predrilled hole on the tibia and femur. We take care to pass the osseous part of the flap through the hole drilled on the lateral condyle of the femur. Also we transferred the m. sartorius anteriorly and then vastus medialis anteriorly and posteriorly. In addition to this techniques, pesplasty completed the treatment of rotatory instability. The patient is permitted to walk with crutches on the 10th day of the operation without weight bearing. The cast it removed at the 2 nd. month. Lenoux-Hill brace is given after the rehabilitation program and it is used for 6 months more (13).

II. Ellison:

47 patients with anterolateral instability were treated by Ellison technique. 48 % of the patients (23 cases) are injured as a result of military exercises, 40 % sportive activites (19 cases) and 12 % of offical accident (5 cases).

Instabilities are evaluated with stress roentgenograms.

Grade I. 31 cases (65 %)
Grade II. 12 cases (25 %)
Grade III. 4 cases (8. 5 %)

The cases are unresponsive to conservative treatment and prone to osteoarthritis. Associated lesions were as follows ;

Technique:

Tibial band is exposed with a 15-20 cm incision beginnig of the mid-portion of the iliotibial band proximally and lasting on the Gerdy tubercle distally. At distal 1, 5 x 1, 5 cm sized osseous flap is prepared. This is passed under the fibular collateral ligament. The osseous flap is fixed with a staple to the anterolateral part of the proximal tiba while the tibia is in external rotation and 60° flexion. Stability control is performed by extantion of the knee; if the applied technique is true, the knee should not extend more than 30° (6). Long leg cast in applied with knee in 60° flexion and tibia is 20° external rotation. Muscle exercises are begun in the early period. Cast immobilization lasted 2 months. When the cast is removed, Lenox-Hill brace is used for an additional 6 months (15).

III. Dacron Synthetique Ligament Prosthesis

33 patients with knee instabilities are treated by DSLP. Indications (11, 17):

1. If reconstruction with autogen tissue for absence or insufficieny of the anterior cruciate is unsuccesful.

2. If the tissues will be used for repair disturbed in the primary injury.

3. For the primary absence or insufficiency of the ACL

4. Acute injuries of ACL (11, 17).

All of the cases were male. 4 different techniques were used.

There are;

1. Only dacron ligament
2. With iliotibial band
3. Dacron ligamant and anterior transfer of m. sartorius-pes plasty
4. Application as Mc-Intosh technique.

Technique:

Combined or Mc. Intosh modification is applied to 33 patients treated by Dacron prosthesis according to the instability (Table I).

Instability	Number	Technique
AL	8	Dacron+Modified Mc Intosh
AM	16	Dacron+Sartorius
Anterior	5	Dacron with wrapped iliotibial band
Anterior	4	Dacron

Table I: Reconstruction technique with synthetic ligaments

The prosthesis is wrapped 20, 2 cm. sized flap which is prepared from ilitibial band by leaving the Gerdy tubercle intact. After the prosthesis is fixed to the lateral condyle of the femur, it is passed under the lateral collateral ligament and anchored to the lateral of the proximal tibia with three staples (modified Mc. Intosh).

Findings

The patients are evaluated subjectively and objectively before and after surgery on a 100 points scala (1). Subjective criterias were pain, instability, swelling, locking, crepitation and tackling (1).

Objective criterias were observation (atrophy and swelling), range of motion and stability. According to these criteria 90-100 points are accepted as excellent, 80-89 points as good, 70-90 as moderate and 0-69 points as poor results (1).

We accepted 80 points and over as successive results.

1. Laxity of medial collateral ligament, tear and insufficiency of anterior cruciate ligament are seen with the group which we used combined Marshall technique. The treatment directed to associate lesions before the reconstruction of ligament (Removel of loose, menisectomy etc.). There appeared only two postoperative skin infections and they are treated with proper antibiotic and dressing. The average follow-up rate was 4. 2 years. The results of this group are on Table II.

PREOPERATIVE	POSTOPERATIVE		
		Succesful	Unsuccesful
Grade I	30	28 (95 %)	2 (4 %)
Grade II	22	19 (95 %)	3 (5 %)
Grade III	3	1 (66 %)	2 (33 %)

Table II: The results of marshall technique

2. The pathologic situations, we came across with the group which we applied Ellison technique, are as follows:

The loosening of lateral capsule (30 cases)

Lateral meniscus tear (12 cases)

Nonfunction of ACL (47 cases)

Lateral condyl defect (6 cases)

Degeneration of lateral face of patella (3 cases)

We have seen two superficial skin infections and one hematoma in our patients and they are treated with proper antibiotic and dressing treatment.

The average follow-up period was years in this group and the success rate was 83 % (Table III). The 8 patientes with unsuccesful results are banned to participate to the heavy athletic activities.

PREOPERATIVE	POSTOPERATIVE	
	Successful	Unsuccesful
Grade I 31	29 (93. 5%)	2 (6. 5%)
12	9 (75 %)	3 (25 %)
4	1 (25 %)	3 (75 %)

Table III: The results of Ellison Technique

3. The pathologic situations in the third group which we applied synthetic prosthesis to 33 patients are as follows:

- 1. Absence of ACL (33 cases)
- 2. Medial condyl defect (7 cases)
- 3. Lateral meniscus tear (14 cases)
- 4. Medial meniscus tear (8 cases)
- 5. Degeneration of lateral condyl (7 cases)

The complications of this group were:

- Superficial infection
- Chronic synovitis
- Breakage of staple

The avarage follow-up period was 2. 5 years in this group and the success rate was 85 %.

Discussion and results

The patients with knee instability must be evaluated throughly. The physical examination of the ones with pure anterior instability must be more detailed because usually low grade collateral lesions accompany these lesions. Whatever the success rate of the surgery of ACL reconstruction, if you skip these lesions, the results will never be satisfactory. For this reason you should renew your examination when the patients is under anesthesia.

The success rate of the patients with instability which we applied Combined Marshall Technique was 87. 2 %. Hunter et al. obtained 72 % (149 cases) excellent, Nicholas obtained 82 % (52 cases) good and Russel obtained 83 % (36 cases) excellent results in their groups (9).

A 47 patients serie with ACL instability were treated with Ellison technique and their success rate was 83 %. Ellison obtained 83 % success rate (18 cases), Kennedy obtained 47 % (15 cases), Arnold obtained 89 % (132 cases), Insall obtained 80 % (25 cases) and Nicholas obtained 75 % success rate at their study groups (6, 7, 9).

We applied Dacron prostheses 33 patients and the success rate was 85 %. The circlage of prostheses with iliotibial band decreased the rate of synovitis. The other methods (Mc Intosh, pesplasty) combined in order to the type instability positively affected the final results. We followed 6 cases for years and the succes rate was 85 %. Hearth et. al. reported 84. 2 % (52 cases), Jiunn-Jerw 80 % (45 cases) and Gillquist reported 85 % (61 cases) followed for 5 years

good results (5, 10). At the begining the dacron prosthesis were manufactured as tissue inductors. But there are some orthopaedic surgeons who use it as permanent prosthesis (Gillquist). The latest studies are condensed to its prosthesis role. The 100 micron large pores also induce the fibrous growth into the prosthesis. The risk of abrasion could be decreased if the sharpness of the tunnel edges lessen.

We can summerize the advantages of the techniques combined in modified Marshall technique as follows:

1. Modified Marshall technique supplies the intraarticular reconstruction of ACL and it stabilizes the knee statically. There are two problems at the ligament reconstruction:

a. The strength of flap and tendon,

b. The viability of it in it's new place.

Since the blood vessels enter the flap from distal end, and the suturation of fat pad and synovium to the flap supplies new vasculature, the maintenance of blood never becomes a problem with our technique. The preparation of flap from the central part of patellar tendon also gives endurance and strength to the flap (3, 9, 12, 14).

2. The muscles which act as flexors, and secondarily act as internal rotators are transferred to primer internal rotators with the use of pesplasty and it supplies dynamic stabilization to the anteromedial aspect of the knee (7, 8, 9, 12, 14, 16).

3. The anteromedial aspect of the knee is statically supported and the tension of the anterior part of the knee is augmented dynamically with the transfer of vastus medialis distally and anteriorly (7, 8, 9, 12, 14).

4. The posteromedial and medial dynamic stabilization of the knee is supported with the transfer of sartorius to the anterior (7, 8).

We do agree that this technique is meaningful at the anteromedial instability if we consider the success rate achieved, since it supplies dynamic reconstruction at the first hand.

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