Primitive Repair Of 42 Fresh Knees Injuries

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Abstract

Introduction

The authors report 42 cases of surgical repair of serious knee injuries.

Patients and methods

The functional signs were dominated by pain and functional impairment causing the interruption of movement. The most frequent mechanism was an indirect injury caused by external rotation of varus flexion (VALFE). With this type of injury we found lesions of the central axis as well as external lateral ligament in 8 cases and cruciate ligament with meniscal lesions in another 8 cases.

X-ray photography showed bone lesions with type of disinsertion while MRI showed ligament or meniscal lesions.

The surgical treatment was made between the 7th and the 9th day after the trauma. We used a ligament suture reintegration with plasty of the muscles of the crow's feet followed in all cases by a rehabilitation program.

Results were excellent and good (75%).

Conclusion

Early repair of some lesions using a ligamentary plasty of the semi-tendinous and the semi-membranous structures of the knee revealed good results.

INTRODUCTION

The primitive repair of knee injuries is still debated [1] but can be justified owing to the possibility of repairing lesions of the collateral ligaments, meniscus, corner points, and reinserting the cutaways of the central axis into their base and ceiling [2].

The aim of this work is to evaluate such a hypothesis.

PATIENTS AND METHODS

Forty-two patients were operated for serious knee sprain injuries. Their average age was 22 years with extremes from 20 to 25 years. Forty were male patients and the etiology of the injuries was dominated by sports practice in 41 cases and a traffic accident in 1 case.

Evaluation of serious knee injuries

Functional signs

During cross-examination, initial functional signs and also those present during clinical examination must be detected. Cross-examination precisely describes how the accident happened as well as the treatment that has been given since then.

The patient’s complaints were:

– Pain: almost continuous. Its severity is not proportional to how serious the anatomic lesions are. It is strongly influenced by the hemarthrosis

– Crackling: it’s a sign of gravity (seriousness) which evokes a ligament or meniscal tearing. It can take place during a kneecap luxation. It must make one think of an associated fracture

– Feeling of dislocation: it is a directing sign, generally well-described by the patient. It evokes a lesion of the central axis and/or of a lateral ligament. A sharp kneecap luxation can occur together with a knee dislocation as well

– Functional impairment: in case of impossible support and functional impairment (for example the player cannot go back to the bench), one can suspect a ligament rupture, a meniscal lesion, or an osteochondral fracture. Support is most often painful if not impossible when hemarthrosis is present

– Swelling: happening almost at the time of the trauma; it produces a hemarthrosis and more often than not is evidence of a rupture of the central axis. It can also be a case of fracture. In case of a secondary formation, it produces a hydrohemarthrosis compatible with a tearing of the peripheral formations, but also the central axis

– Over-tightening: the notion of over-tightening must be used carefully in the case of a knee presenting with an abundant effusion. Actually an important hemarthrosis can be the cause of an antalgic flessum.

Mechanism of Injury: Direct trauma

Anterior contusions with severe trauma in the sagittal or frontal plane were found in 12 cases. The broken fragments were located on the opposite side of the knee. On the sagittal plane, an antero-posterior trauma with skin lesion of the anterior part of the knee indicates a possible posterior cruciate ligament lesion.

Indirect traumas have been detected in 30 cases

Two types of mechanisms were preferentially found during sports accidents:

– VALFE: 20 traumata in valgus, flexion, and external rotation from an exaggerated movement or resistance against shock on the foot (« tackle » in soccer). We observed damage of the posterior cruciate ligament, of the internal ligamentary plan, and of the internal meniscus. The internal meniscus itself was rarely affected. Those lesions may be associated with each other (antero-interne triad).

– VARFI: 10 traumata in varus, flexion, and internal rotation. We essentially found lesions of the posterior cruciate ligament. In case where the force mechanism continued, there was also an antero-external formation lesion with capsular fracture (Segond fracture). Many other mechanisms have caused capsuloligamentary and meniscal lesions. These mechanisms have most often been difficult to specify for the pentads and dislocations, but lesional associations allowed to guess the original causal mechanism.

Other lesions: Meniscal lesions

They are frequently associated with ligament injuries because of the similarities of the injury-causing mechanism. In 8 cases the peripheral posterior horn of the internal meniscus was found to be involved. In 75% of the of so-called external « pentad » cases there was a peripheral disinsertion of the internal meniscus. The internal and external meniscal lesions were 5 times associated with a rupture of the LCP. The internal meniscal disinsertions were also frequent in the series.

Clinical examination was rigorous, systematic, and always bilateral. Sometimes the knee was unexaminable and extremely painful with abundant effusion. In such a case, puncture made the examination easier. If the examination was difficult, we had to look for possible complications as well as the conditions of initial measures such as immobilization or icing of the knee and perform the examination at a later time.

When the knee was easy to examine, the examination had to be done as completely as possible in order to establish a precise initial diagnosis. The traumatic and surgical histories were recorded.

In case of an emergency, face, profile, and axial knee X-rays were performed. The procedure took place between the 7th and 9th day under general anesthesia in the operating room where also a testing of the knee was done. In 14 cases, an arthroscopy was performed to check for internal damages.

Radiological examinations

Standard knee X-rays were essential.

Standard X-rays

Face, exact profile, and axial knee-cap X-rays were performed. We have found an avulsion of the prespinal bone surface (LCA) (view of the indentations if necessary) or of the posterior tibial spine (LCP) in 2 cases with a fracture of Segond, in 3 cases external capsular cutaway lesion, and in 5 cases a bone cutaway of the collateral ligaments. There was an opening of the internal or external femoro-tibial space-line caused by a controlateral ligament medial or lateral lesion in 35 cases. We also found 8 cases of antero-external capsular cutaway. A notch on the external condyle

on the radiography of the profile (impaction of the condyle on the posterior edge of the platform) was indicative of a LCA injury.

Dynamic medical images

We compared dynamic medical images in anterior translation 20° flexion (LCA), posterior drawer between 70 and 90° flexion (LCP),as well as images in varus (LLE) and in valgus position (LLI). These images were more often than not impracticable in emergencies because of the pain. Moderate stress images under anesthesia of complex lesions (pentads and dislocations) were realized before the surgical incision in order to objectify the injury (anterior, posterior, valgus, varus, and internal and external translations).

MRI showed ligament and meniscal lesions.

Arthroscopy

We performed an arthroscopy in 16 cases.

Surgical treatment

The surgical treatment is only performed in stage 3 lesions (suture with simple dots, in U, in X, or overlapping) when there was a central axis rupture or an associated lesion of the PAPI. The surgical treatment was performed between the 8th and the 9th day after the trauma.

Displaced junctional lesions were processed by the osteosynthesis of bone fragments (screws, hook). Ligament avulsions were reinserted by transosseous points, anchor, and screwing with washer. Junctional lesions with bone fractures were found 9 times. Functional treatment consisted of early mobilization with support and temporary mobilization from 4 to 6 weeks between rehabilitation sessions. It is essential to not disregard associated lesions, in particular those of the central axis.

Fracture of the retrospinal surface

Two displaced fractures were operated by performing a direct osteosynthesis through Trickey posterior track. We used screws because of the fragment volume.

Avulsion at the ceiling

Avulsions at the ceiling were reinserted using transosseous dots 20 times. This reinsertion was associated with reinforcement of the crow's feet tendon.

Intraligamentary ruptures

The surgical treatment included the crow's feet tendon. Immobilization in extension allowed for good control of the posterior translation but raised a low patella.

Rehabilitation

Postoperative rehabilitation was performed in several stages:

Phase I: protection of ligamentoplasty and prevention of adhesions; passive mobilization from 5 to 90% at the start to 135. Isometric contractions between 60–90° with leg stretching: electrostimulation of the quadriceps.

Phase II: starting from week 6, cycling and walking on a plane surface; contraction of hamstrings and quadriceps in isometrics and isotonic fashion.

Phase III: beginning of running on a flat surface; proprioceptive rehabilitation.

Phase IV: return on competition field with acceleration.

Average recovery time was 75 days.

Stability, indolence, and tolerance under fatigue were very good in 82% of the cases. Joint mobility was almost normal in 98% of the cases.

RESULTS

Patients were evaluated according to the ARPEGE classification.

Patients' distribution according to the functional value.

Table 1

Values of stability	Number	Percentage (%)
Very good	34	80.95%
Good	4	9.5%
Medium	4	9.5%

Table 2

Values at pain and postoperative resistance	Number	Percentage (%)
Very good	34	80.95%
Good	4	9.5%
Medium	4	9.5%

Table 3

Value of joint mobility	Number	Percentage (%)
Very good	17	40.4%
Good	19	45.23%
Medium	6	14.28%

Distribution according to subjective result

Table 4

Subjective result	Number	Percentage (%)
Very satisfied	24	57.14%
Satisfied	18	42.80%

Global distribution

Table 5

Result	Number	Percentage (%)
Very good	19	45.23%
Good	13	30.95%
Medium	10	23.8%

DISCUSSION

In all cases the injury was serious enough to prevent the patients from continuing any physical activities.

Most lesions involved VALFE while 13 meniscal lesions were noticed, 3 requiring reinsertions.

Clinical examination of the knee was hampered by the pain necessitating anesthesia in some cases.

Results of knee stability: 92% with very good and good results with early functional recovery; 89% had some resistance on the operated knee; 86.75% had a good joint mobility as a result of early intervention and immediate postoperative functional rehabilitation. All the patients were satisfied and the overall results were very good in 75% of the cases. This percentage is comparable to that of other types of ligamentoplasty.

Face, profile, and axial X-rays showed multiple bone lesions or signs of ligament rupture. Dynamic images have been difficult to perform because of the pain and a differential of more than 2 mm was a sign of ligamentary rupture. Laxicity may be underestimated because of pain [3].

Surgical treatment of severe knee injuries was done only in some very specific lesions and some forms of triads or pentads associated with bone insertion cutaway.

TREATMENT METHODS

Triads [3–5]

– Antero-internal: combined ruptures of LCA, LLI, and of PAPI resulting from an accident in VALFE was the most frequent lesions with isolated rupture of LCA. LLI is the first structure to be injured before the LCA. That lesion is also called “unhappy triad of Don O’Donoghue [6]. This lesional association was questioned by Shelbourne who found more external meniscal lesions in association with those of the internal lateral ligament and the anterior cruciate ligament in 60 early transplants of the LCA [7].

– Postero-internal: combined ruptures of LCP, LLI and PAPI. It is caused by an accident in forced valgus knee extension or by antero-posterior shock on the upper part of the tibia (knee in internal rotation flexion). It is 10 times less frequent than the antero-internal triad. One has to think of an involvement of the LCP in presence of an internal extension laxity without breach of LCA.

– Antero-external retroligamentary: the combination of a breach of LCA, LLE, and PAPE. It is caused by an accident in varus position close to the severe ligament lesions of the knee.

– Antero-external preligamentary: the combination of rupture of LCA, LLE, and antero-external capsule.

– Postero-external: the combination of rupture of LCP, LLE, and PAPE. It is the least frequent triad (less than 1%) [8].

– Posterior: the combination of a lesion of PAPI, PAPE, and LCP. It occurs during an accident in supported hyper-extension and if the movement continues, the LCA breaks and leads to a posterior pentad.

Pentads [3,5]

– Internal: the combination of rupture of the LCA, LCP, LLI, and PAPI. It is caused by the same accidents as with the internal triads but more violent as the knee is in extension. It is the more frequent pentad representing about 5% of serious ligament lesions of the knee. The 2 beams of the LLI can be ruptured at two levels or at the same level. The deep beam can be inserted in the femoro-tibial space, preventing the reduction. We must not stop with the diagnosis of the internal triad in presence of an antero-internal laxity and have also to test the LCP.

– External: the combination of lesions of LCP, PAPI, PAPE, and LCA are rarer and caused by the same accidents as external triads, especially if the knee is in extension. The rupture of the LCA precedes that of the LCP. When passive hyper-extension predominates the LCP breaks first [3].

– Posterior: combining lesions of the LCP, PAPI, PAPE and LCA caused by accidents in the recurvatum. Bi-crossed lesions (LCA and LCP) fall mostly within the pentads as they are associated with lesions of peripheral formations in 35% of the cases and meniscal lesions in 75% of the cases [9]. The presence of peripheral detachments that heal spontaneously [10] may be part of the category of crossed

isolated lesions due to the absence of peripheral laxity.

Straightaway ligamentoplasty

We use the same techniques as with chronic laxity. In our series, the use of crow's feet tendon (DI–DT) included ligamentoplasty without conservation of the LCA ligament stumps. This technique gives equivalent or even better results than in chronic plasties for laxity control.

Antero-external retroligamentary triad

These lesions should be treated surgically because chronic residual, antero-external, retroligamentary laxities are difficult to treat.

All lesions should be cured: suture of external meniscus lesions, suturing or reinsertion of the popliteus uscle, suture of the femoris biceps muscle, as well as suture or reinsertion of the LLE. The postero-external lesions are more favorable as there is a reinsertable bone cutaway. Rehabilitation must be started straightaway.

After evaluation, functional value of joints was good.

CONCLUSIONS

Surgical repair in the acute phase of primary lesions of the knee yielded very good and good results and allows a quick resumption of sports activities.

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