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Case Report

Inveterated Knee Dislocation Treated with Rotating Hinged Knee Arthroplasty: A Case Report

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Abstract

Introduction: The purpose of this paper is to present a possible treatment in case of inveterated knee dislocation which presented in out Institution as a subtle case after a common knee sprain.

The Case: A 74-year-old female patient with acute knee pain presented to our Institution in the Emergency Room, after a knee sprain occurred 48 hours before. Clinical assessment reported a knee swelling and limitation of the range of motion; no neurovascular complications were found. Knee X-ray was normal except for a lamellar bone detachment on medial condyle. The patient was treated conservatively with knee brace ad no weight-bearing; an MRI and clinical examination were prescribed after 3 weeks. Unfortunately the patient was not compliant and ignored medical prescription: she came back to outpatient clinic after 96 days without MRI with valgus knee and limping. An X-ray was executed and we observed a knee dislocation with disruption of both cruciate land collateral ligaments. In consideration of knee instability and the age of the patient we decided to treat this patient with a rotating hinge knee arthroplasty

Results Patient came back home after 6 days after surgery with good range of motion and good control of pain. After 40 days knee R.O.M. was 0°-90° and a good muscle trophism was observed.

Conclusions: Knee dislocation is a relatively rare but also a potentially serious injury for the patient. A diagnostic classification is essential for accurate diagnosis and treatment, which often requires multidisciplinary approach.

Level of evidence: Level IV case study

Keywords: Knee; Inveterated Dislocation; Knee Instability; Rotating Hinge

Introduction

Knee dislocations are among the most difficult orthopedic pathologies being treated and often put the affected limb at risk in the event of a missed diagnosis or late intervention. They represent about 0.02-0.2% of all orthopedic diseases [1]. The incidence of these lesions is widely underestimated, as many dislocations reach the clinical attention following reduction. According to some authors, each patient with two or more major ligament injuries besides the anterior cruciate ligament and the medial collateral ligament, may have had a knee dislocation. [16]. Most cases are caused by road accidents (about 50% of the dislocations described) [2], while the remaining cases are due to accidents which occurred during the practice of sports activities (about 33%) or simple falls (12%). Generally, a knee dislocation follows a high-energy trauma and often falls within the broader framework of the polytraumatized patient. The entity of the trauma causing joint dislocation has

recently been questioned by some authors, who have identified a fourth subset in the traumatic mechanism: falls in patients with high BMI [3].

The management of a patient with knee dislocation is extremely complex and often requires a multidisciplinary approach: careful emergency room triage and an ATLS assessment is essential in case of polytraumatized patients with ISS > 15, [4]. The diagnostic path is also less comfortable than you may think.

Case Report

In February 2012, a 74-year-old female patient with acute knee pain that persisted for 48h (VAS 7-8) required immediate clinical attention. During remote pathological anamnesis, the patient reported a pharmacologically treated arterial hypertension with a good therapeutic response, and an anxious-depressive syndrome, also treated pharmacologically. From the osteo-articular point of view, she also complained suffering from a persistent left gonalgia for about a year, which was treated with cycles of Visco supplementation and physiotherapy.

The patient was brought to the emergency department after a low-energy trauma: falling to the floor following a distortion of the left knee. The initial clinical objectivity showed a valgus axis, a retropatellar swelling and good quadriceps tonotrophism; there was also a widespread tenderness on palpation, in the medial epicondyle area. The ligament and meniscal states were also mis-evaluated due to the patient's poor compliance, which counteracted any attempt to mobilize the tibia. Neuro-vascular examination was normal. A standard radiographic examination was performed, which does not show substantial anomalies except for a lamellar detachment in the medial epicondyle area (Figure 1).

Sprained knee injury of the left knee was diagnosed with ligamentous lesions of the medial compartment. The patient was dismissed with an articulated brace with locked articulation at 30° flexion-extension and no weight-bearing for 21 days. A prophylaxis dose regimen was performed against venous thromboembolism with mono-administration of Enoxaparin 4000UI and recommended a venous discharge and local cryotherapy. Furthermore, the orthopedic check-up was scheduled after 21 days after performing an MRI of the knee.

Figure 1: X-ray examination in Emergency room.

The patient showed up for the check-up after 96 days without an MRI, limping on the left side and wearing the brace in an inappropriate way. At this point, we repeated the radiographic examination and an MRI in consideration of the functional limitation, flexion contracture and anatomical deformity. It was highlighted, a Type IV knee dislocation according to Schenck's classification [13] with complete lesion of the two cruciate ligaments and the two collateral ligaments (Figure 2). A CT angiography was performed to rule out vascular lesions, and then we decided to reduce the dislocation during sedation. The dislocation was irreducible due to the interposition of soft tissue, so we decided to reduce the knee dislocation by performing a rotating-platform knee arthroplasty after obtaining the patient's consent.

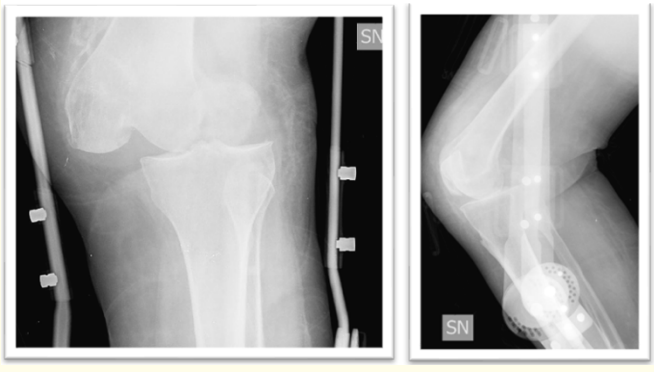

Figure 2: 4 month X ray.

Surgical and rational approach for the treatment

The MRI performed showed a complete lesion of the four main knee stabilizers, in particular: ACL, PCL, and MCL; the LCL lesion was sub-total. In addition, extensive osteochondral lesions were described. In consideration of the age, the positive anamnesis for gonalgia and the type of lesion, as well as the time elapsed from the initial trauma, we decided for a total knee artrhoplasty. In the pre-operative planning, we decided to make a tenolysis of the extensor mechanism and manually detach the rectus femoralis from the shaft in order to expose the articular space; standard longitudinal access was performed after a limb pneumonischemia and a medial para-patellar arthrotomy. No lateral dislocation of the patella was necessary to complete the prosthetic replacement; we decided to cut the femur with 5 ° of valgus and 3 ° extra-rotation; the tibia was osteotomized with standard extra-medullary reference. As far as the ligamentous balance is concerned, we decided to dissect the LCL remnant, a sub-periosteal release of the pes anserinus was performed and the flexion contracture was eliminated after selective release of the posterior capsule. After the the osteotomies were performed, both epiphyseal components were cemented and stabilized with a diaphyseal stem. At the end of the procedure, the prosthesis was stable and the ROM was complete. A suture was made for anatomical planes after intra-articular hemodrainage. The patient was assisted to ambulate from the 2nd post-operative day and achieved a 90° active flexion on the first week.

Discussion

In the absence of supporting literature, we opted for this type of treatment, considering a variety of factors, such as the severity of the ligament and osteochondral lesions, age, as well as the fact that the dislocation was considered to be inveterated; it's a well-known fact that multiple ligament reconstructions are less successful when inveterated [18]. The age of the patient did not recommend the use of multiple ligament reconstructions due to the high rate of arthritic degeneration after a knee dislocation, which case studies report to be around 87% [19].

The irreducibility of the dislocation was due to the pinching of the medial structures below the condyles and to the diffused peri-patellar fibrosis, which also made arthrotomy reduction difficult, as described by some authors [17]. It's well known that only 11% of the knee dislocations have a lesion of the four main stabilizers on the front and sagittal plane [14]. The choice of the constraint was indicated by the ligament state: in our opinion, a condylar constrained type prostheses was not suitable because of the instability, resulting from complete ligament-insufficiency, would have caused a tibial CAM rupture. Ligament injuries documented at MRI were clinically confirmed. We chose to cut 10mm of the tibia, though the smaller polyethylene insert was 12mm in order to gain stability; The ligamentous balance was completed by dissecting the remnant of the LCL, which in our opinion could have created a valgizing moment with subsequent eccentric overload of the polyethylene. As for the gap balance, the flexion space appeared greater than the extension space. We chose to increase the extension gap by making a selective release of the pes anserinus in order to make the two spaces proportionate, therefore improving proprioceptive recovery.

Accurate management of such complex lesions requires a deep anamnestic collection, aimed at a better understanding of the extent of the trauma, the timing, and the possible comorbidity of the patient. Particular attention must also be paid to the first maneuvers performed during first aid: sometimes the paramedic staff or the patient himself tend to extend the dislocated knee, while reducing the dislocation. The time spent between the traumatic event and the clinical visit is a factor that must always be considered: even the most serious vascular lesions, often have insidious onsets in just a few hours, literally precipitating the clinical scenario.

Equal importance must be given to the objective examination, which must be very accurate, starting from the vascular state of the limb to the posterior tibial and dorsalis pedis pulses, and evaluating them in relation to the counter-side [5]. The Ankle-Brachial Index Measurement (ABI) is of common use: an alteration of the blood pressure values greater than 10% as been shown to have a sensitivity of 100% for detecting vascular lesions [6].

In knee dislocations, the incidence of vascular lesions is an average of 20% [7] and the popliteal artery, due to its anatomy, is often the most affected structure. Routine-second-level examinations, such as angio-Tc and angio-MRI for the detection of the vascular status, remains controversial: if, on one side, this can be justified by the fact that sub-intimal lesions have a blurred and invasive clinical diagnosis, on the other hand, recent studies show that only 13% of

the arterial lesions require surgical treatment [8]. In our opinion, close clinical monitoring of the patient's vascular status should be conducted in the first 6-8 hours; in case of alteration of the ABI and/or of the peripheral pulses, we proceed with 2nd level examinations. Timing is fundamental: vascular lesions treated with an 8hr delay or more, have a greater risk of amputation, 86% respect to 12%, for those treated early [9]. The neurological examination is complementary to the vascular examination: it is most important to evaluate the integrity and function of the deep and superficial peroneal nerve as well as the tibial nerve; The incidence of nerve lesions varies in literature from 4.5% to 40% [10].

It should be noted that nerve lesions are often more common in low-energy traumas than in high-energy ones [3]. The nerve structure most often affected by lesions is the common peroneal nerve, both for its anatomical course and also because of the limited vascular supply, which becomes minimum near the proximal tibio-peroneal articulation [11].

The prognosis, in the case of nerve injury, is variable: only 20% of patients fully recover while 50% have no recovery [12].

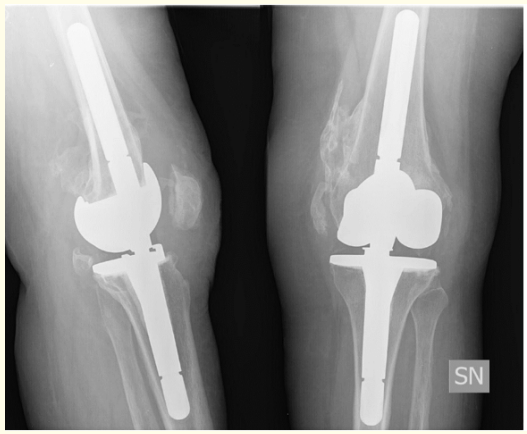

Figure 3: 1-year x-ray follow up.

Follow-up

The patient was dismissed on the 6th post-operative day. No local or systemic complications were recorded. At the time of dismissal, the ROM was 5-90 ° and the patient was walking with 2 anti-brachial aids. On the 40th day, during the clinical check-up, the surgical wound appeared normal, the quadricipital tonotrophism was good and the ROM was 0-90 °. The patient is periodicaly monitored with clinical and instrumental follow-ups and, during her last check-up, maintained the last ROM values, Lysholm's score 88, and was able to walk without aid. She has sporadic pain (VAS 2) but no need for pain-relieving drugs. The radiographic examinations show a good femorotibial alignment and a marked peri-prosthetic calcification of the medial compartment. Completely asymptomatic.

Figure 4: 5-year X-ray follow-up.

Conclusion

Knee dislocation is a relatively rare but also a potentially serious injury for the patient. A diagnostic classification is essential for accurate diagnosis and treatment, which often requires multidisciplinary approach. The complexity of the trauma and the articular degeneration are the main reasons that often lead to unsatisfying results. Literature on the topic is still incomplete: further studies are needed to draw firm conclusions about the type of treatment in this type of injury.

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Conflicts of Interests

The authors declare that they have no conflict of interest.

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