

Case report

Quadriceps tear, infection and dislocation: Three rare complications after total knee arthroplasty. A case report

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ABSTRACT

Introduction: Infection after a total knee arthroplasty (TKA) is one of the most severe complications, with an incidence that ranged from 0,5 % to 1,8 %, while the incidence of a quadriceps tendon tear after total knee arthroplasty range from 0.1 % to 1.1 %. Dislocation of a TKA is another rare but very serious complication with an incidence of 0.5 %. After all, the association of these three complications, that quickly occur together, is extremely rare condition.

Presentation of case: Ninety years old man underwent to TKA for right knee osteoarthritis. During rehabilitation, the patient had quadriceps tendon rupture and underwent to tenorrhaphy. Three months after tenorrhaphy, on suspicion of infection, the patient received a surgical debridement. At this time total knee prosthesis was well fixed and was not removed. After another five months, the patient felt again and the radiographs of the right knee showed a posterior dislocation of the TKA treated by closed reduction in operating room, under general anesthesia. At the latest follow-up, clinical and radiological examinations showed good alignment of the TKA prosthesis, without loosening and good functional capacity.

Discussion: Orthopedic surgical treatment in an elderly patient could expose to many complications. We could speculate that musculo-tendinous lesion and infection favored the TKA dislocation.

Conclusion: Infection, tendon injuries and dislocation are serious complications after TKA. Poor outcomes are often described for each of these complications in the current literature, however our patient recovered a good quality of life after treatment, despite the complexity of these complications and the old age.

1. Introduction

Ruptures of quadriceps tendon are a rare complication post total knee arthroplasty (TKA) that generally occurred after a fall. Variable results are reported in the literature after the treatment of these injuries; however, the best results are reported in primary repairs, while in chronic tears they are worse [1–3]. Post-TKA infections are commonly classified into acute and chronic. In agreement to literature reports, the best results for both medical treatment with antibiotics and surgical revision are obtained for early treatment, while the late infections are more difficult to eradicate and represent a challenge to overcome [4–8]. Tibiofemoral dislocation after TKA is an uncommon complication. Most dislocation are posterior, with the tibial component translated posteriorly to the femoral component in the sagittal plane. In acute dislocation, a closed reduction attempt is mandatory and generally, it easily

succeeds. In case of failure of closed reduction, or residual knee instability, or recurrence of the dislocation, the surgical options usually are the replacement of the insert increasing its height, or the complete revision of the implant [9–11]. We report an uncommon case of a ninety years old man affected by severe osteoarthritis and treated by TKA. In the following one year after surgery, the patient underwent to a quadriceps tendon rupture, a periprosthetic infection and a dislocation of the TKA. All three complications were diagnosed, promptly treated, and luckily resolved every time.

To the best our knowledge, the sequence of these three complications occurred in isolation and rapidly evolving in the same patient, is rarely reported in the literature.

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2. Presentation of the case

This work been reported in line with the SCARE criteria [12].

A good health ninety years old man affected by osteoarthritis of the right knee with severe pain, not responsive to conservative management, underwent to surgical treatment for TKA.

In the next first year after TKA, the patient presented a sequence of three serious complications starting with a rupture of the quadriceps tendon 40 days after surgery, followed by periprosthetic infection after another three months, and tibiofemoral dislocation five months later.

The prosthesis implanted was postero-stabilized with sacrifice of the posterior cruciate ligament using a median longitudinal approach. After surgery without any complication the post-operative radiograph showed a good alignment of the right knee and the prosthesis was well positioned (Fig. 1). Four days after surgical procedures the patient walked with canes and was transferred to a rehabilitation hospital to improve muscle strength and joint movement. The range of motion (ROM) of the operated knee obtained two weeks after surgery was 0° to 100° , and the clinical aspect was good with a well healed incision wound. The patient complained only mild pain but was overall satisfied with the treatment. To further improve strength, ROM and a normal walking without canes, another four weeks of rehabilitation were prescribed.

During successive rehabilitation, the patient fell down and he was admitted to the emergency room of our hospital 40 days after surgery. The range of motion of the operated knee was very limited; he could not extend the leg, presented the typical clinical sign of a patellar superolateral gap and was unable to walk. The clinical diagnosis was of quadriceps tendon injury and therefore surgical treatment was performed for the primary direct repair of quadriceps tendon rupture. The surgical approach performed was the upper half of the previously used approach for TKA, proximally extended for about 4 cm. Considering the quality of the tissue, the location of the tendon rupture that occurred about 2 cm below the myotendinous junction, it was opted for direct tendon repair, using high-strength non-absorbable sutures. After three months, the patient was again admitted to our hospital on suspicion of periprosthetic infection because of pain and swelling of the operated knee. At the time of admission, laboratory blood tests showed an increase of the values of erythrocyte sedimentation rate (ESR: 112 mm/h) and of C-reactive protein (CRP: 89 mg/L) and the culture examination of the synovial fluid did not allow to identify infectious agent. The patient, despite of his very advanced age, was not affected by pathologies favoring infectious processes, such as diabetes or other chronic diseases and he was initially treated with broad-spectrum antibiotic therapy. In spite of this conservative treatment, after two weeks a skin fistula

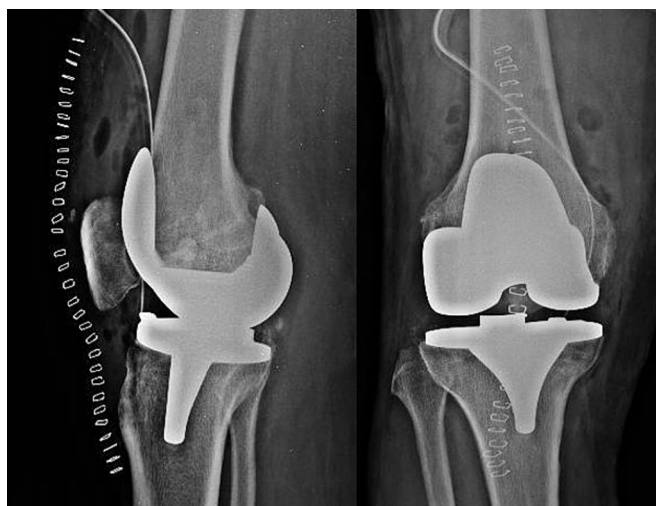


Fig. 1. Radiographic examination after TKA in a 90-year-old patient that shows a good alignment of both femoral and tibial components.

appeared near the surgical scar. At this time, after consulting an infectious disease specialist, was performed a surgical debridement using the same surgical approach, but performing a lozenge extension near the fistula for the complete excision of the contaminated tissues. Abundant scar and fibrotic tissue was noted during surgery. In addition, purulent joint fluid and infected tissue was excised and analyzed to perform a specific antibiotic treatment. TKA was well fixed without signs of mobilization. An intraoperative pulse irrigation protocol of the right operated knee with Povidone-Iodine solution diluted to a 3% concentration (30g/L) in two liters of saline was used two times for 5 min. A carrier for the local release of gentamicin and vancomycin was inserted in the surgical site (Fig. 2). The patient's knee was then immobilized with an articulated brace for 2 weeks. The surgical wound healed without complications, the blood tests were normalizing after 4 weeks and the patient was satisfied with the result obtained.

After a further 5 months, the patient fell again and reported a complete posterior dislocation of the TKA without neurovascular complications (Fig. 3). At emergency room, a closed reduction with careful traction and extension of his right knee was performed under intravenous general anesthesia. After reduction, the stability of the knee was clinically and radiographically evaluated and a plaster cast was applied for 4 weeks to immobilize the knee in extension (Fig. 4). For additional 4 weeks, the patient wore an articulated brace during walking. At the final follow-up, one year later, the patient was in good health, walking without any aid, and the radiographs of his right knee showed a good alignment of the TKA without any sign of instability.

3. Discussion

The incidence of a quadriceps tendon tear after TKA is rare and ranges from 0.1 % to 1.1 % [1,13].

Usually quadriceps tendon tears result from a traumatic event, but many cofactors like systemic diseases predispose patients to this particular injury [14].

Surgery is always required and is mainly guided by the different nature of the injury, by the quality of the remaining tendon and by the integrity of bony structures and surrounding soft tissue. For complete ruptures, the options available are tissue repair or tissue reconstruction using different grafts and several surgical techniques are reported like allograft, autograft and synthetic mesh [13,15,16]. Moreover, in acute cases, primary repair with sufficient tissue has the best results with only a 2 % reoperation rate reported in literature [17].

In our case the acute quadriceps tendon rupture was promptly and easily primary repaired using high-strength, non-absorbable sutures, because during the surgery we observed the presence of sufficient tissue suitable for a simple tenorrhaphy.



Fig. 2. Radiographic examination after surgical debridement for infection that shows carrier in the surgical site for the local release of antibiotics.

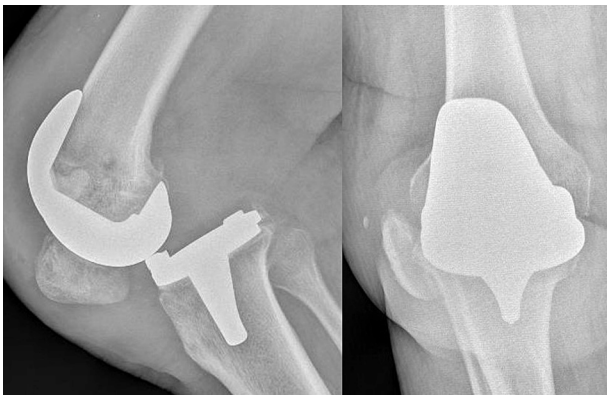


Fig. 3. Radiographic examination after an accidental fall shows the complete posterior TKA dislocation without components mobilization.



Fig. 4. Radiographic examination after closed reduction of the TKA dislocation shows a good alignment of the prosthetic components.

The frequency of periprosthetic knee infection after TKA is about 1–2 % in the current literature. Usually this severe complication is classified into early acute infection and late chronic infection. The best results for medical or surgical management are reported for early acute infections while late chronic infections are less responsive to medical and surgical treatment and cause serious disability with severe functional limitations [4–8].

In our case, the initial diagnosis of early acute infection was based only on clinical appearance and blood tests, but the medical treatment with antibiotics failed. Fistula and surgical swabs did not allow a certain and specific microbiological diagnosis, however a promptly surgical debridement, associated to an intraoperative pulse irrigation protocol and to a carrier for the local release of gentamicin and vancomycin, permitted to eradicate the infection [18].

The dislocation following TKA is a rare complication with a prevalence that ranges from 0,15 % to 0,5 % [19].

In posterior dislocation, the most important risk factors include mechanical malalignment, hardware failure, infection, obesity, female gender and muscular imbalance [20]. In our case, there was no apparent mechanical cause, the prosthesis was well balanced and well aligned intraoperatively, and the dislocation was the consequence of a fall without other factors related to the patient. However, some authors reported that a deficient extensor mechanism could be cause considerable instability after TKA [9,21]. Moreover, in the literature, is rarely reported that a periprosthetic knee infection represents a risk factor for a

tibiofemoral dislocation after primary TKA.

We can speculate that in our patient, the association of these two comorbidities occurred in a short time and together with the fall, may have strongly favored the dislocation mechanism.

Generally, an attempt of closed reduction of the knee dislocation is always performed acutely, otherwise a surgical reduction is performed. After reduction is mandatory to verify the stability of the implant and in case of residual instability different modalities of revision are reported to prevent a new dislocation. Minimally surgical procedure can be the simple increase of the height of the insert but, if the instability persists, major surgical procedures are necessary until the complete revision of the prosthesis. In our case a good post-reductive stability of the implant was observed and, also considering the advanced age of the patient, we opted for a conservative treatment by applying an extended knee cast for 4 weeks with a good final result. Prudently, the patient wore an articulated knee brace only during walking for the following 4 weeks.

We consider that multiple orthopedic surgery procedures in an elderly patient may expose to major complications and every post-operative pathological event may expose to further complications. In our case, we could speculate that muscular imbalance due to quadriceps tendon injury and infection may have played a role in determining the TKA dislocation. Moreover, it is known that rehabilitation plays an important role influencing functional recovery and discharge outcomes after complex cases in elderly. Our very old patient was not compliant with the rehabilitation program and probably this reason could also have favored these major complications [22].

The treatment decision for every complication presented was justified by advanced age of the patient and his consequent fragility. We neither removed the prosthesis after infection, or performed surgical revision after TKA dislocation because both components were well fixed and the implant appeared stable. Therefore, every time, we chose the less invasive treatment.

4. Conclusion

In conclusion, quadriceps tendon ruptures, periprosthetic infections and knee dislocations, are rare but serious complications post TKA. The combination of all three pathological events in the same patient is an exceptional condition as reported in the described case. However, the best results for each of these complications are achieved with an early treatment as surprisingly happened in our patient, in spite of the advanced age. The limitation of our study is a consequence of a case report. We believe that further studies are necessary to better define the relationship between TKA and major complications and how each complication can affect the other.

CRediT authorship contribution statement

Conceptualization (P.F., F.D.M.); Data curation (S.S., V.D.L.); Methodology (S.S., G.R.); Project administration (V.D.L.); Supervision (P.F., F.D.M.); Validation (P.F., F.D.M.); Roles/Writing - original draft (F.D.M., A.C.); and Writing - review & editing (G.R., V.D.L.). All authors made substantial contributions to the conception or design of the work and revised the manuscript critically for important intellectual content. All authors gave final approval of the version submitted for publication.

Informed consent statement

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

The study was notified to the ethical committee of our hospital.; it

does not need a specific ethical approval.

Guarantor

Fernando De Maio
Pasquale Farsetti.

Research registration number

The research do not need any registration.

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Declaration of competing interest

We certify that no benefits in any form have been received or will be received from a commercial party related to the subject of this article.

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