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Editorial

Patello-femoral clunk syndrome-current concepts

1. Etiopathogenesis

Patellofemoral crepitus and clunk syndrome troublesome complications of total knee arthroplasty with a reported incidence of 0%–18%.¹ Patella clunk syndrome is a syndrome of patellofemoral dysfunction, consisting of painful catching, grinding, or jumping of the patella on knee extension, and is a well-recognized complication after total knee arthroplasty.² Patellar clunk syndrome is characterized by the formation of a fibrous nodule at the articular side of junction of superior pole of patella and the quadriceps tendon.³

They are primarily associated with implantation of posterior cruciate substituting designs. These entities are the result of peripatellar fibrosynovial hyperplasia at the junction of the superior pole of the patella and the distal quadriceps tendon which becomes entrapped within the superior aspect of the intercondylar box of the femoral component during knee flexion. When the knee extends, a crepitant sensation occurs as the fibrosynovial tissue exits the intercondylar box. The nodule being wedged into the intercondylar notch during flexion and dislodged on extension. A more recently described intraarticular fibrous band syndrome may also potentially cause a similar painful audible clunk.¹

The Patellofemoral pain due to an unusual suprapatellar fibrous nodule developed in after posterior stabilized total knee arthroplasty. It may involve impingement of the patellar prosthesis itself on the quadriceps tendon.⁴

Numerous etiologies have been proposed such as femoral component designs with a high intercondylar box ratio, previous knee surgery, reduced patellar tendon length, thinner patellar components, reduced patella-patellar component composite thickness, and smaller femoral components. Preventative measures include choice of femoral components with a reduced intercondylar box ratio, use of thicker patellar components, avoidance of over-resection of the patella, and debridement of the fibrosynovial tissue at the time of knee arthroplasty. Most patients with crepitus are unaware of the problem or have minimal symptoms so that no treatment is required. If significant disability is incurred, symptoms can be eliminated in a high percentage of patients with arthroscopic debridement of the fibrosynovial hyperplasia.¹ The patella clunk syndrome irrespective of whether or not the patella was

Resurfaced.² The patients with soft-tissue impingement under the patella into 3 groups: (I) patellar clunk syndrome, the isolated fibrous nodule located in the suprapatellar lesion without the other fibrous tissues causing the impingement (II) impinging hypertrophic synovitis, generalized hypertrophic synovitis with no fibrous nodule; and (III) the combination of types I and II, the suprapatellar fibrous nodule with generalized hypertrophic synovitis.⁵ The Press Fit Condylar Cruciate sacrificing prosthesis is more likely to be associated with the patellar clunk syndrome.⁶ The formation of peripatellar inflammatory scar tissue is related to implant design and surgical technique. In patients with more disabling symptoms such as catching, early intervention with open scar excision should be considered.⁷ Posterior stabilised TKR had been noted to have a higher incidence of this problem. Mobile-bearing posteriorly stabilised TKRs have been introduced to improve patellar tracking and related problems by a mechanism of self-alignment.⁸

While patella clunk syndrome and patellofemoral crepitus are separate entities, they share a common pathophysiology with widely varying clinical presentations. The symptoms range from a painless subtle crepitation to a painful, palpable and audible clunk. In the case of patellofemoral crepitus, the fibrosynovial hyperplasia does not develop into a discrete nodule and no audible clunk is present. Conversely, these patients complain of anterior knee pain and a continued grinding sensation with loading of the knee in a 30–60 degree range. In either case, symptoms typically develop within 2 months to 2 years following TKA. The natural history of patellofemoral crepitus and patellar clunk syndrome reveal that up to 50% of patients improve with conservative treatment and the majority are unaware the condition exists. However, in both syndromes, the symptoms can be disabling warranting surgical intervention with either an arthroscopic or open debridement. Nevertheless, prevention is preferred.² The design of a total knee prosthesis has a strong bearing on the incidence of the patella clunk syndrome.⁹

Femoral components with a deep trochlear groove and smooth transition of the intercondylar box appear to better accommodate any peripatellar fibrous nodule that may form after total knee arthroplasty.¹⁰ PS designs included a high transition zone from the trochlear groove to the intercondylar box with an abrupt transition to the distal femoral articular

geometry.¹ This transition zone by defining the intercondylar box ratio, as the intercondylar box height versus the anterior-posterior height of the femoral component. Femoral components with a high intercondylar box ratio allow contact of the distal quadriceps tendon earlier in flexion than components with a lower ratio. On arthroscopic examination, hypertrophic synovial tissue was identified at the junction of patella and quadriceps tendon in all patients.¹¹ The medial-lateral geometry of the intercondylar box has also been implicated as a causative factor. It is concluded that both the height and the width of the intercondylar box were design features leading to synovial entrapment.²

The incidence of patellofemoral complications in patients with PS TKAs has long been attributed to patellar baja and anterior placement of the tibial tray. A lower Insall-Salvati ratio, lower patellar component height, lower position of the proximal pole of the patella, and anteriorization of the tibial tray were all associated with a higher incidence of patellar clunk syndrome. These data demonstrate that post-operative patella baja and anterior placement of the tibial tray is related to the development of patellar clunk syndrome. The patellar baja is secondary to either inferior placement of the patellar component or an excessive distal femoral cut. In either case, the altered patellofemoral kinematics may be in part responsible for the development of patellar clunk syndrome.² The effect of increased knee flexion achieved with the MIS approach, which resulted in an increase in patella clunk, Patellar crepitus and clunk syndrome have also been attributed to abnormal patellar tracking secondary to inadequate soft-tissue balance or tibial component malrotation and mal tracking of the patella.¹² In patients with/without pre-op PF pain, the incidence of post-op PF pain, clunk and crepitus is lower in patients who underwent patelloplasty.¹³ The proximal overhang of the patellar button beyond the superior border of the patella led to a catching of the component on the anterior portion of the intercondylar box. Trimming of the overhanging portion of the button allow complete resolution of symptoms. There is a correlation of anterior placement of the femoral component and the use of an undersized femoral component with patellofemoral complications following PS TKA. There is a correlation between both the use of a small femoral component as well as a flexed posture of the femoral component with the development of patellar crepitus. It is speculated that increasing the posterior condylar offset may result in a relative anterior shift of the intercondylar box, thus predisposing to quadriceps tendon irritation.

2. Prevention and treatment

While many authors have demonstrated that painful patellar crepitus or clunk can effectively be treated with either an open or arthroscopic debridement but prevention is preferred.¹ Selection of PS femoral components with a lower intercondylar box ratio (trochlear groove extended more posteriorly and distally) has been shown to lessen patellar crepitus and clunk. It is wise to avoid use of an undersized femoral component positioned in a flexed posture. Excessive femoral component flexion can be prevented by placing the entry site

for intramedullary distal femoral cutting guide jig more anteriorly. Due to the anterior bow of the femur, a more posterior entry site may lead the surgeon to cut the distal femur in excessive flexion. Surgeons can avoid creating patella baja by avoiding excessive distal femoral resection raises the joint line and creates patella baja. The neutral or posterior placement of the tibial tray may lessen the development numerous patellar complications including crepitus and clunk. Normal patellae contact the trochlear groove around 20° of flexion, and as knee flexion increases the contact stresses increase and shift superiorly. Therefore, the patellar component should be placed as superior as possible to avoid unresurfaced bone contact with the femoral component, but not extend superiorly beyond the superior border of the patella which can result in quadriceps tendon irritation and the subsequent development of patellar crepitus or clunk. Additionally, creation of a thinner composite thickness and use of a smaller (thinner) patellar component should be avoided which reduces the offset of the quadriceps tendon from the top of the trochlear groove. Thus, surgeons should be careful to avoid over-resecting the patella and should use the largest possible patellar component that fits the native bone stock. It is further demonstrated a reduction in peripatellar crepitation from 40% to 21% by avoiding overstuffing the patellofemoral joint and resecting bone that is not covered by the patellar component. Always excise this tissue at the superior pole of patellae routinely to avoid the development of patellofemoral crepitus and clunk. MRI helps confirm the clinical diagnosis of patellar clunk. The complications may include malposition of the patellar component and dynamic problems such as recurrent subluxation or disruption of the extensor mechanism.¹⁴ Focal scarring at the upper patella pole may cause a locking sensation or impaired motion during movement of the knee. The accumulation of hypertrophic fibrous tissue at the superior margin of the patellar button can give rise to catching or “clunking” of the extensor mechanism.¹⁵ The ideal treatment is removal of the suprapatellar tissue and a patellar component revision.¹⁶ The fibrotic reactions after total knee arthroplasty: (A) Multiples or complex bundles reactions; and (B) Singles or isolates nodular forms: fibrous nodule in the femoropatellar area (clunk syndrome), and fibrous nodule in the intercondylar notch.¹⁷ Open resection through a limited lateral incision for the treatment of patellar clunk syndrome associated with patellar tilt in total knee arthroplasty is described. The procedure is done under local anaesthesia.¹⁸ Although recurrences arose after arthroscopic debridements, none developed after arthrotomy and patellar button revision. Femoral component design, post-surgical inflammation, and altered extensor mechanics are potential etiologic agents of this complication.¹⁹

3. Conclusion

The patellofemoral clunk syndrome is not uncommon and sometimes turns out to be a biologic disaster for the patients and surgeons. Apart from meticulous surgical technique selection of the implant design is of great importance for the best outcome.

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