Australasian Medical Journal 2010, 1, 2, 183-185.

Does total knee arthroplasty affect the patellar tendon reflex?

Richard Jamieson, Jennifer Flynn ,and David Love

Royal Hobart Hospital

CASE SERIES

Please cite this paper as: Jamieson R, Flynn J, Love D. Does total knee arthroplasty affect the patellar tendon reflex? AMJ 2010, 1, 2, 183-185. Doi 10.4066/AMJ.2010.196

Corresponding Author:
Richard Jamieson
Orthopaedic Outpatient Clinic
Royal Hobart Hospital
rpj@utas.edu.au

Abstract

Background

There may be a perception in clinical practice that any deficit in the patellar tendon reflex arc could be attributed to a total knee arthroplasty (TKA). There is no evidence in the literature to support this conclusion.

Methods

Sixty-six knees were examined to determine whether TKA affects the patellar tendon reflex.

Results

There was no difference observed between the knees with a history of TKA and those knees without a history of TKA.

Discussion

There is no plausible reason that TKA should affect the patellar tendon reflex. Despite this, in clinical practice TKA is often thought to be responsible for absent patellar tendon reflexes. This study supports the hypothesis that there is no effect of TKA on patellar tendon reflexes.

Key Words

Total knee arthroplasty; patellar tendon reflex; knee jerk

Background

The patellar tendon reflex is commonly tested in clinical examination to evaluate the integrity of the femoral nerve and the L2-L4 segments (1, 2). A stimulus to the patellar tendon stretches the quadriceps muscle, exciting muscle spindles and in turn causing the quadriceps to contract (2, 3, and 4). An absent or decreased stretch reflex indicates a lesion in the reflex arc itself (5). Several conditions may affect the integrity of the reflex arc: muscle pathology (polymyositis, muscular dystrophy), nerve pathology (polyneuritis, peripheral neuropathy, spondylosis, motor neurone disease, poliomyelitis) as well as systemic disease such as abetalipoproteinaemia (5). Peripheral neuropathy is the most common cause of decreased reflexes (5, 6). Theoretically in a standard total knee arthroplasty (TKA), there is no interruption of this arc. The procedure involves an anterior midline skin incision and a medial parapatellar retinacular approach. In the standard TKA, there is no incision made in the quadriceps or patellar tendons. The patellar is everted to gain access to the knee joint. Occasionally, in order to improve exposure, a quadriceps snip or partial patellar tendon release may be required. This involves a partial incision that is repaired upon closure. The anterior cruciate ligament and the medial and lateral menisci are excised. Partial excision of the infra-patellar fat pad is performed in order to expose the lateral tibial plateau. The bone surfaces are prepared and the prosthetic components are then implanted. The incised deep parapatellar fascia (medial retinaculum) is then repaired without any disruption to the extensor mechanism. The wound is then closed in layers from deep to superficial (7).

There may be a perception in clinical practice that any change in a patellar tendon reflex may be attributed to a TKA. To our knowledge no published literature has examined this relationship. The

purpose of this case series was to determine if patients who have had a TKA have any change to their patellar tendon reflex.

Methods

The knees of patients attending a number of general orthopaedic outpatient clinics over a 3 month period at the tertiary referral centre of Tasmania (Royal Hobart Hospital), who had undergone a standard TKA in the past, were assessed post-operatively for a patellar tendon reflex. Verbal informed consent was obtained from all patients. The reflex was assessed independently by a minimum of two examiners using a standard tendon hammer. The results were collated and were found to be uniform by both assessors and as such have been included as a single examination finding. Both knees were assessed and the operative knee was compared to the non-operative knee. Each reflex was assessed as present or absent, normal strength and equal or unequal, left greater than right or right greater than left. To reinforce the reflex, Jendrassik manoeuvre (8) was performed. The only inclusion criterion was a history of TKA. Patients with bilateral TKA were also included. All patients attending clinic fitting our inclusion criteria were approached and all agreed to be included in the study. Patients attending for a 2 week post-operative wound review were not considered for inclusion as examination would have been painful. Patients with superficial infections precluding assessment were also excluded from the study. Details of the patients' past medical and surgical history, and operation notes were recorded. Any previous surgery to both the operative and non-operative knee was documented. Patients who had undergone previous knee surgery were not excluded from the study.

Results

The knees of 33 patients (18 females and 15 males) were assessed (66 knees in total). The patellar tendon reflex was present in all 43 operative knees (33 patients), CI 92-100 per cent. 10 of these patients had bilateral TKA. There were 3 decreased patellar tendon reflexes, 1 operative knee and 2 non-operative knees. Average age at surgery was 67.7 years (SD 10.4) and average age at assessment of patellar reflex was 70.8 years (SD 10.2). The average time from surgery to assessment was 3.06 years (SD 3.8). Eight surgeons performed the 33 operations. Osteoarthritis was the intra-operative diagnosis in 30 (90.9 per cent) patients, with the remaining 3 (9.1 per cent) diagnosed with rheumatoid arthritis. Partial resection of the infra-patellar fat pad was performed in all patients. One patient had a quadriceps snip and partial patellar tendon release to facilitate better access. This was subsequently repaired and on post-operative examination this patient had a normal patellar tendon reflex. Two patients were excluded from the study due to recent surgery and superficial infection preventing adequate assessment.

Reflex present/absent	Number
Operative knee reflex present (including bilateral knees)	43 (100.00%)
Non-operative knee reflex present	22 (95.56%)

Reflex decreased	Number
Non-operative knee affected	2 (8.70%)
Operative knee affected	1 (2.33%)

Table 1. *Reflexes present, absent and decreased among operative and non-operative knees.*

Discussion

Three patients in this study had patellar tendon reflexes that were assessed as decreased. Two of these had decreased patellar tendon reflexes of the non-operative knee, with one of these patients having an absent knee patellar tendon reflex, though the absence of this had been documented prior to surgery. One patient had a decreased reflex of the operative knee. Though we have explored some possible contributing factors, we are unable to make conclusions on the aetiology of reflexes that are decreased or absent. It is possible that the rate of an abnormal response we have seen is the level observed in an aging population (9), which may indicate that TKA does not affect this underlying rate. A 95 per cent CI of 92-100% (Wilson method) indicates that if the true incidence of patellar tendon areflexia post-operatively is greater than or equal to 92 per cent, clinicians should not just dismiss an absent reflex as a post-operative phenomenon.

There were a number of limitations to this study. We have conducted a small retrospective case series. A prospective study assessing the magnitude of any change of patellar reflex prior and subsequent to surgery would be appropriate. The assessors were not blinded to the operative side, allowing that potentially there was observer bias. Blinding in this instance would be difficult to achieve due to obvious surgical scars. The presence and normal strength of a reflex is obvious to the assessor, and it is the more subjective assessment of relative strengths of reflexes that may be subject to bias. There were relatively few in this study, and our main outcome of interest was presence or absence of the reflex. Due to small numbers, this study was inadequately powered to allow comparison between sexes, or for other variables. Larger numbers of knees with the use of a control group for comparison would allow further analysis and potentially stronger conclusions. This is an equivalence study and our results show there to be no difference between operative and non-operative knees.

There is no scientifically plausible reason why a total knee arthroplasty should affect the patellar tendon reflex. The patellar tendon is handled and at times incised, but always repaired. Though the infra-patellar fat pad is commonly resected, this should not infringe on the reflex arc. Our results support this hypothesis. When a patient presents with a prior history of TKA and with an altered ipsilateral patellar tendon reflex, we have shown that it is unlikely that any alteration is a consequence of TKA, and any alteration of the patellar tendon reflex should be considered in the clinical context and investigated appropriately.

References

1. Gray's Anatomy: the Anatomical Basis of Clinical Practice. 39th ed. Spain: Elsevier Churchill Livingstone; 2005, pg 1414.
2. Nolte J. The human brain: an introduction to its functional anatomy. 6th ed. China: Mosby; 2002, pg 238-241.
3. Liddell ET, Sherrington CS. Reflexes in response to stretch (myotatic reflexes). Proc R Soc Lond Ser 1924;96:212.
4. Matthews P. The knee jerk: still an enigma. Can J Physiol Pharmacol 1990;68:347.
5. Walker HK. Deep tendon reflexes. In: Clinical Methods, the History, Physical and Laboratory Examinations. 3rd ed. USA: Butterworths; 1990.
6. Fauci AS. Harrison's principles of internal medicine. New York: McGraw-Hill; 1998, pg 97-98.
7. Canale S, Beaty J. Campbell's Operative Orthopaedics. 11th ed. Philidelphia: Mosby Elsevier; 2008, pg 257-60.
8. Gassel MM, Diamantopoulos E. The Jendrassik maneuver. Neurology 1964; 14: 555-560.
9. Kodama T, Nakagawa M, Arimura K, Koriyama C, Akiba S, Osame M. Cross-sectional analysis of neurological findings among healthy elderly: study in a remote island in Kagoshima, Japan. Neuroepidemiology 2002; 21:36-43.

PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.