



Published By :
Surgical Residency Program
Universitas Syiah Kuala



Implant loosening after total knee replacement with pigmented villonodular synovitis: a case report

Azizah Mallapasi^{1*}, Fidelis Heru², Riza Aprizal³

ABSTRACT

Introduction: Aseptic loosening after total knee replacement (TKR) defined as prosthesis loosening from bone along with macrophage-induced inflammatory response without infection or trauma that may arise due to gradual mechanical loss of fixation while pigmented villonodular synovitis (PVNS) refers to a benign disease arises from synovium. Although the etiology of PVNS remains unclear and the underlying cause of PVNS occurrence following total knee replacement are limited in publication studies, a hypothesis of microtrauma causing recurrent hemorrhage may lead to PVNS. To date, there is no clear consensus on the primary treatment option for PVNS and surgery is generally the primary approach. Surgical excision with total synovectomy is considered to be the gold standard for PVNS.

Case description: A 63-year-old woman with a history of left total knee replacement (TKR) 3 years prior came to our center with initial complaints of persistent pain and progressive impairment of daily activities. The patient later underwent a revision procedure along with open synovectomy due to suspected PVNS finding which confirmed with histopathological studies. Three months postoperatively, the patient showed marked improvement of left knee range of motion and quality of life measured with KOOS scoring of 78 out of 100.

Conclusion: This case presenting an aseptic loosening after total knee replacement accompanied by PVNS finding confirmed by histopathologic studies. Implant loosening is thought to be related to loss of mechanical fixation or chronic inflammation, while PVNS occurrence following the implant loosening is likely triggered by microtrauma.

Keywords: pigmented nodular synovitis, implant loosening, total knee replacement.

Cite This Article: Mallapasi, A, Heru, F., Aprizal, R. 2026. Implant loosening after total knee replacement with pigmented villonodular synovitis: a case report. *Journal of International Surgery and Clinical Medicine* 6(1): 5-8. DOI : 10.51559/jiscm.v6i1.80

¹Faculty of Medicine, Universitas YARSI, Indonesia

²Department of Orthopedic and Traumatology, RS Bhayangkara Tk. I Puskokkes POLRI, Indonesia

³Faculty of Medicine, Universitas YARSI, Indonesia

*Corresponding author:
Azizah Mallapasi; Faculty of Medicine,
Universitas YARSI, Indonesia;
azizahmaranilmips@gmail.com

Received: 2026-01-22
Accepted: 2026-04-12
Published: 2026-05-14

INTRODUCTION

Aseptic loosening after TKR defined as prosthesis loosening from bone along with macrophage-induced inflammatory response without infection or trauma that may arise due to gradual mechanical loss of fixation or inadequate prosthesis fixation during the primary procedure¹ and pigmented villonodular synovitis (PVNS) refers to a benign lesion arises from synovium.² While the etiology of PVNS remains unclear and the underlying cause of PVNS occurrence following total knee replacement are limited in publication studies, a hypothesis of microtrauma due to implant instability, poor implant positioning, or disproportionate implant size may cause recurrent hemorrhage and form the chronic synovitis which later lead to PVNS.³ To date, there is no clear consensus on the primary treatment option for PVNS and surgery is generally

the primary approach. Total synovectomy of the affected joint with arthroscopic approach or open surgery is considered to be the gold standard for PVNS.⁴

CASE DESCRIPTION

A 63-years-old woman presented with a history of left total knee replacement (TKR) came to our center with initial complaints of persistent pain and progressive impairment of daily activities. The patient has undergone the procedures three years ago after diagnosed with Kellgren-Lawrence grade 4 osteoarthritis followed by recurrence knee pain six months post-surgery. Two years after procedure, the patient had a trouble of walking and standing notably with the stairs, also addressed hearing of 'clicking' sound when walking. Recent illness and change in medical status were denied.

In physical examination, the patient is clinically stable, while reduced range of motion, tenderness, and warmth observed on the left knee compared to the contralateral side. Anthropometric status assessed with body mass index (BMI) was 33.7 kg/m² and quality of life (QoL) assessed using Knee Injury and Osteoarthritis Outcome Score (KOOS) scored 37% out of 100%. Radiographic finding shows installed implant on the left femur and the condylar emmentia of the left tibia and bone loosening was seen in the medial and lateral condylar of the left femur (**fig. 1**). Calcification was seen in the popliteal and infrapatella regions of the left there with decreased bone density. While laboratory studies are in normal limits with no sign of elevated inflammation marker.

Later, the patient underwent a one-stage revision procedure (**fig. 2**) where

both loose prosthetics are removed and replaced with a cemented long-stem implant (**fig. 3**). Intraoperatively, brownish-rubbery-firm synovial tissue were found and open synovectomy performed (**fig. 4**). The synovial tissue was taken for histopathologic study which confirmed a villous and nodular structures and foamy histiocyte cells, multinucleated giant cell lymphocytes, hemosiderophages in between the structures. It was also found a cholesterol slit with bones trabecula and congestive hyperemic blood vessels in compatible with the features of tenosynovial giants cell tumor (pigmented villonodular synovitis).

Three months follow up after revision procedure, we found that our patient had a significant improvement of left knee range of motion (ROM) from 0° extension to 110° flexion with KOOS scored to 78% out of 100%.

DISCUSSION

Based on our patient clinical features along with laboratory studies and radiographic finding of weak-link fixation of implant-cement interface and bone loosening in the medial and lateral condylar of the left femur, we suggest this case interpreted as possible aseptic implant loosening with pigmented villonodular synovitis.

Aseptic loosening after TKR defined as prosthesis loosening from bone along with macrophage-induced inflammatory response without infection or trauma that may arises due to gradual mechanical loss of fixation or inadequate prosthesis fixation during the primary procedure. Subsequently, debris from wear off particulate may lead to aseptic osteolysis and biological loss of fixation.¹

In this case, the implant loosening was the primary factor for one-stage TKR revision. Intraoperatively we found brownish-rubbery-firm synovial tissue which suspected displacing the implant and radical synovectomy was done. The tissue histopathological studies confirmed a pigmented villonodular synovitis appearance (PVNS).

PVNS is described as to a benign disease of arises from synovium and a subtype of tenosynovial giant cell and characterized by joint effusions and bony erosion with slow onset.² Commonly the



Figure 1. X-ray of left knee implant loosening after three years post primary TKR shown in anteroposterior and lateral projection



Figure 2. Long stem prosthesis used for the revision procedure

patient present with painless swelling and reduced range of motion may caused by expanding tumor tissues in the affected joint. It distinguished by the capacity to infiltrate subchondral¹ bone and causing erosions which affects the soft tissue lining of joints.⁵

The etiology of PVNS remains unclear and the underlying cause of PVNS occurrence following total knee replacement are limited in publication studies. Though, the case is exceedingly rare, a hypothesis of microtrauma due to implant instability, poor implant



Figure 3. X-ray of left knee shown in anteroposterior and lateral projection after revision surgery with cemented long prosthesis implanted in femur and tibia



Figure 4. Synovium tissue taken after radical synovectomy and primary TKR implant removed

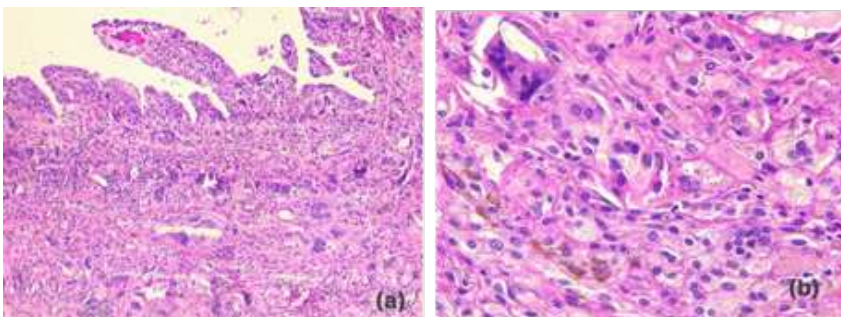


Figure 5. Histopathological study of synovium tissue showing the composed of multinucleated giant cell, foamy macrophages, inflammatory cell and hemosiderin confirming PVNS (a) H&E staining 4x magnification, (b) H&E 10x magnification

positioning, or disproportionate implant size may cause recurrent hemorrhage may form the chronic synovitis and lead to PVNS.³ Repeated microtrauma and bleeding into the joint will lead to haemoglobin break down into iron which later deposits to the surrounding joint tissue.⁶ This process reflects on our histopathologic work up on the synovial tissue that reveals villous and nodular structures and foamy histiocyte cells, multinucleated giant cell lymphocytes, and hemosiderophages in between the structures.

To date, there is no clear consensus on the primary treatment option for PVNS and surgery is generally the primary approach.⁴ Surgical excision with total synovectomy of the affected joint with arthroscopic approach or open surgery is considered to be the gold standard for PVNS treatment.⁷ For localized forms of PVNS, marginal excision is recommended, while for diffuse forms, total synovectomy is recommended. In various medical centers, diffuse PVNS is treated with open or arthroscopic synovectomy, sometimes combined with external beam radiotherapy or intra-articular radiotherapy⁸ although only open total synovectomy was done in our patient.

Whilst studies shows that TKR revision procedure substantially lessen the symptoms and improves daily function as well as overall survival rate after revision approximately reached 90% in 5 years and 75%-80% in 10 years with gradual reduction thereafter.⁹ In our three months follow up after revision procedure, our patient marked an improvement of knee range of motion and KOOS scored 78% out of 100%. Previous case report¹⁰ confirmed PVNS finding in 54 years old male patient on who undergone two stage total knee arthroplasty (TKA) revision. It was also noted a significant improvement of knee range of motion with a Knee Society Score (KSS) to 92/90 during the three-year follow up.¹⁰

Despite surgical intervention, PVNS demonstrates a recurrence rate of up to 50%, leading researchers to investigate alternative therapeutic strategies. Nevertheless, the prognostic factors associated with PVNS recurrence remain poorly defined.¹¹ Our reports are limited

by its relatively short follow-up period of three months postoperatively, which may not fully capture the long-term outcome and the recurrence pattern of PVNS.

CONCLUSION

This case presenting an aseptic loosening after total knee replacement accompanied by PVNS finding confirmed by histopathologic studies. Implant loosening is thought to be related to loss of mechanical fixation or chronic inflammation, while PVNS occurrence following the implant loosening is likely triggered by microtrauma. This patient treated with a one-stage revision TKR and open total synovectomy resulted in significant clinical improvement at three months follow up. However, given the high risk of PVNS recurrence and unclear prognostic factors, long-term follow up is required.

DISCLOSURES

FUNDING

None.

CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTION

Conceptualization and study design: Mallapasi A, Heru F; Writing – original draft: Mallapasi A; Writing – review & editing: all authors.

ACKNOWLEDGMENTS

None.

REFERENCE

1. Jones MD, Buckle CL. How does aseptic loosening occur and how can we prevent it? *Orthop Trauma*. 2020;34(3):146–52.
2. Burton TM, Ye X, Parker ED, Bancroft T, Healey J. Burden of Illness Associated with Tenosynovial Giant Cell Tumors. *Clin Ther*. 2018;40(4):593–602.e1.
3. Karami M, Soleimani M, Shiari R. Pigmented villonodular synovitis in pediatric population: review of literature and a case report. *Pediatric Rheumatology*. 2018;16(1):6.

4. AKINCI O. Long-term results of surgical treatment of pigmented villonodular synovitis of the knee. *Acta Orthop Traumatol Turc*. 2011;45(3):149–55.
5. Brahma M, Vinceneux A, Cassier PA. Current Systemic Treatment Options for Tenosynovial Giant Cell Tumor/Pigmented Villonodular Synovitis: Targeting the CSF1/CSF1R Axis. *Curr Treat Options Oncol*. 2016;17(2):10.
6. Frassica FJ, Bhimani MA, McCarthy EF, Wenz J. Pigmented villonodular synovitis of the hip and knee. *Am Fam Physician*. 1999;60(5):1404–10; discussion 1415.
7. Chang JS, Higgins JP, Kosy JD, Theodoropoulos J. Systematic Arthroscopic Treatment of Diffuse Pigmented Villonodular Synovitis in the Knee. *Arthrosc Tech*. 2017;6(5):e1547–51.
8. Jain JK, Vidyasagar JVS, Sagar R, Patel H, Chetan ML, Bajaj A. Arthroscopic synovectomy in pigmented villonodular synovitis of the knee: clinical series and outcome. *Int Orthop*. 2013;37(12):2363–9.
9. Roman MD, Russu O, Mohor C, Necula R, Boicean A, Todor A, et al. Outcomes in revision total knee arthroplasty (Review). *Exp Ther Med*. 2022;23(1):29.
10. Nicolino T, Pérez Abdala JI, García-Mansilla I, Astoul Bonorino J. Loosening of Total Knee Arthroplasty Associated with Pigmented Villonodular Synovitis: Case Presentation and Literature Review. Vol. 89. 2024. p. 528–37.
11. Yang B, Liu D, Lin J, Jin J, Weng X, Qian W, et al. Surgical treatment of diffuse pigmented villonodular synovitis of the knee. *Zhongguo Yi Xue Ke Xue Yuan Xue Bao*. 2015;37(2):234–9.



This work is licensed under a Creative Commons Attribution