



Case report

Soft tissue releasing and serial casting for management of flexion contracture after primary total knee arthroplasty in a patient with hemophilia

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ABSTRACT

Introduction and importance: Flexion contracture following total knee arthroplasty (TKA) in patients with hemophilia is not uncommon, and this complication reduces knee range of motion and produces morbidity for the patient. This report states the success of treatment of flexion contracture after primary TKA in a patient with hemophilia; by open soft tissue contracture releasing and serial casting.

Case presentation: A 20-year-old-man presented with hemophilia type A. He had undergone TKA for treatment of secondary osteoarthritis, following chronic hemophilic arthropathy of his right knee. After surgery, the patient had progressive flexion contracture posture, until he had 45 degrees of knee flexion contracture at his 3 month follow up. The patient received open soft tissue releasing, then serial casting for 6 weeks. After this, the cast was removed and he continued with a home rehabilitation program. At 1 year follow, his knee flexion contraction contracture had improved up to 10 degrees. The patients function had recovered and he was satisfied with this treatment.

Clinical discussion: The complications after TKA in patients with hemophilia are very challenging in there management; with flexion contracture after TKA being a common complication in patients with hemophilia.

Conclusion: In severe flexion contracture following TKA, soft tissue releasing combined with serial casting is effective, and might be an option that is less invasive than revising all of the TKA components.

1. Introduction and importance

Hemophilic arthropathy is a chronic process of recurrent bleeding in knee joints, and hyper vascularized synovitis that is caused by iron deposits in synovial tissues [1]. The final result of the chronic arthropathy process is articular destruction, stiffness of the knee joint and severe pain [1,2]. Presently, total knee arthroplasty (TKA) is considered to be the gold standard treatment for hemophilia patients whom have secondary osteoarthritis [3]. The management of secondary osteoarthritis following hemophilic arthropathy is challenging in terms of how to manage complications after surgery. Flexion contracture following TKA is a complication that reduces the knees range of motion, which produces morbidity in the patient [4]. Flexion contracture in hemophilic arthropathy is caused from fibrosis of the surrounding soft tissue, combined with periarticular osteopenia [5]. In the case of flexion contracture following TKA, there are many methods to correct this deformity; such as, manipulation under anesthesia [6], dynamic

splinting [7] or revision TKA [8]. In this report, the authors present the results of successful treatment of flexion contracture after TKA in a patient with hemophilia, by open releasing of the soft tissue contracture structure coupled with serial casting. This work has been reported in line with the SCARE criteria [9].

2. Case presentation

A 20-year-old-man presented with chronic knee pain, with his underlying disease being hemophilia A. The patient had severe pain in his right knee upon motion, a limping gait and quadriceps atrophy. The range of motion of his right knee was 130 degrees flexion, and he had extension of only 30 degrees in the flexion contracture position. He could walk with a walker. The patient had refrained from smoking, drinking alcohol, or use of recreational drugs. Radiographic showed evidence in loss of articular cartilage, with a severe femoral bone defect (Fig. 1A); therefore, the patient considered undergoing TKA.

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Cemented posterior stabilized prosthesis TKA was performed, by an experienced knee arthroplasty surgeon (VY), with a midline longitudinal incision and medial parapatellar approach under general anesthesia. The intra-operative findings found severe osteoarthritis of the right knee, with 30 degrees flexion contracture and severe bone loss central to the distal femur. The distal femur was cut with an intramedullary guide, and the proximal tibial cut was performed perpendicular to the mechanical axis with the extramedullary guide. The distal femur was resected 6 mm proximal to the standard cut, combined with posterior capsule releasing for correcting the flexion contracture. The femoral component was augmented with the intramedullary stem, due to distal femoral condyle bone defect and severe osteoporosis. The initial post-operative range of motion was 130-degree flexion, but still had flexion contracture of 10 degrees. Postoperative radiographic films showed an acceptable alignment of the prosthesis (Fig. 1B). The patient did not have initial post-op complications, and was discharged with a home rehabilitation program.

After a follow up visit at 2 weeks after operation, the patient complaint about limited knee range of motion, and his physical exam revealed that his knee had 30-degree flexion contracture. The patient was prescribed pain medication and with a rehabilitation program to stretch the knee. However, at his 12 week follow up appointment, the flexion contracture had progressed into a 45-degree flexion contracture position. At this point, the patient was considered for open soft tissue releasing and casting. Intraoperative passive range of motion of the knee under general anesthesia was flexion to 130-degrees, and extension was up to 45-degree flexion contracture (Fig. 2A). The procedure was performed when the patient was in a supine position. A longitudinal incision was performed at the posteromedial aspect of the right knee to identified tightness structure (Fig. 2B). The gracilis tendon and semitendinosus were performed with a Z-plasty tenotomy, then the semimembranosus, biceps femoris and posterior joint capsule were released (Fig. 2C). The post-operative right knee's range of motion was 130 flexion, and could be extended to 25-degree flexion contracture. After the wound was sutured, a cylindrical cast was applied to maintain the knee to the farthest extension position (Fig. 2D).

Knee flexion contracture remained at 25-degrees until his 2 week follow up. After the patient had his stitches removed a new cylindrical cast was applied, with the knee in a 15-degree flexion position. At his 6 week follow up, the patient could flex his knee to 130-degrees, and the knee flexion contracture had improved up to 20-degrees (Fig. 3B). After cast his was removed the patient had home passive range of motion stretching exercises and a night-time knee splint. The patient cooperated with the treatment and came to all his follow-up appointments. At his 6-month follow-up, his flexion contracture had improved to 15-degrees

(Fig. 3C). Following this at 1-year follow-up, there was only 10-degrees of flexion contracture remaining (Fig. 3D), and he had ambulation without gait aid. The objective knee society score was 80 and functional score was 60. The patient was instructed to frequently perform knee stretching in an extended position while sitting on a bed. Although, he was satisfied with the results of his treatment, the patient stated that the most uncomfortable period during treatment was the lost ability to flex his knee while he was in a cast.

3. Clinical discussion

Total knee arthroplasty in patients with hemophilia is a complex surgery. Range of motion after operation is an important factor for outcomes, and it is correlated with quality of life [10]. The main cause of flexion contracture deformity is the chronic process of recurrent bleeding into the knee joints, combined with hyper vascularized synovitis, leading to soft tissue contraction that produces flexion deformity [1,2,11]. Surgical intervention of knee flexion contracture in hemophilia following TKA other than revision TKA is limited. There have been some reports of surgical interventions to treat flexion contracture of the knee in patients with hemophilia without TKA. In a previous report in patients with hemophilia having had flexion contracture of the knee being treated with a circular external fixator revealed results showing improvement of outcome and deformity [12].

Serial stretch casting is one of the treatments of choice for non-surgical intervention of knee flexion contracture. The effectiveness of serial stretch casting, with open soft tissue releasing or lengthening, was reported as having a good outcome in cerebral palsy patients [13]. The author considered applying this method for this patient, and the results were satisfactory. The patient had improved range of motion and functional outcome at 1 year follow up after being treated with this technique.

4. Conclusion

Flexion contracture after primary total knee arthroplasty with open releases and serial casting is one treatment option for patients with hemophilia, who have flexion contracture of the knee following TKA.

Ethical approval

This case report was approved by the Institutional Review Board, Faculty of Medicine, Songklanagarind Hospital, Prince of Songkla University.

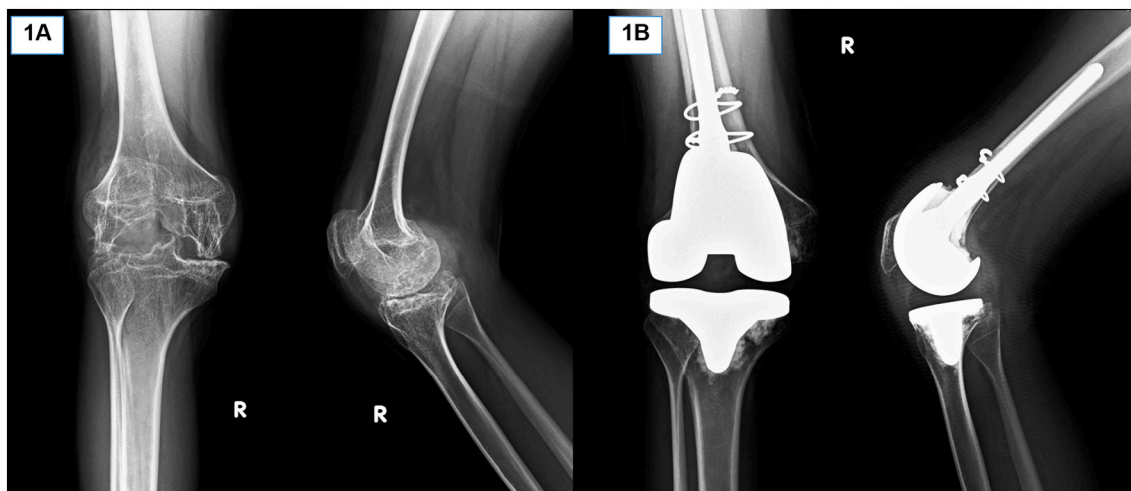


Fig. 1. The pre-operative (1A) and post-operative (1B) radiographic films of the right knee.



Fig. 2. The intraoperative passive ROM of the right knee (panel A), the tightness structure (panel B), the open tenotomy by Z-plasty (panel C) and the post-operative applied cylindrical cast (panel D).



Fig. 3. Post-operative length of motion at 2 wks. (3A), 6 wks. (3B), 24 wks. (3C) and at 1 year (3D) follow up.

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CRediT authorship contribution statement

Wongthawat Liawrungueang: Conceptualization, Methodology, Visualization, Writing– of the original draft.
 Boonsin Tangtrakulwanich: Resources, Data curation.
 Varah Yuenyongviwat: Data curation, Writing - review & editing,

Supervision.

Guarantor

Varah Yuenyongviwat, M.D., Associate Professor.

Registration of research studies

None.

Consent

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 upon request.

Declaration of competing interest

None.

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References

- [1] G. Roosendaal, M.E. Vianen, M.J. Wenting, A.C. van Rinsum, H.M. van den Berg, F. P. Lafeber, et al., Iron deposits and catabolic properties of synovial tissue from patients with haemophilia, *J. Bone Joint Surg. (Br.)* 80 (3) (1998 May) 540–545.
- [2] L. Sokoloff, Biochemical and physiological aspects of degenerative joint diseases with special reference to hemophilic arthropathy, *Ann. N. Y. Acad. Sci.* 240 (1975 Jan 20) 285–290.
- [3] L.P. Solimeno, G. Pasta, Knee and ankle arthroplasty in hemophilia, *J. Clin. Med.* 22 (2017 Nov) 6(11).
- [4] S.T. Goudie, A.H. Deakin, A. Ahmad, R. Maheshwari, F. Picard, Flexion contracture following primary total knee arthroplasty: risk factors and outcomes, *Orthopedics* 34 (12) (2011 Dec 6) e855–e859.
- [5] B. Atilla, O. Caglar, M. Pekmezci, Y. Buyukasik, A.M. Tokgozolu, M. Alpaslan, Pre-operative flexion contracture determines the functional outcome of haemophilic arthropathy treated with total knee arthroplasty, *Haemoph. Off. J. World Fed. Hemoph.* 18 (3) (2012 May) 358–363.
- [6] Z. Li, F. Lan, Y. Shen, S. An, N. Xu, C. Yin, et al., Prediction of the need for manipulation under anesthesia for flexion contracture after total knee arthroplasty in patients of advanced age, *J. Int. Med. Res.* 47 (7) (2019 Jul) 3061–3069.
- [7] E. Finger, F.B. Willis, Dynamic splinting for knee flexion contracture following total knee arthroplasty: a case report, *Cases J.* 1 (1) (2008 Dec 29) 421.
- [8] T.K. Fehring, S.M. Odum, W.L. Griffin, T.H. McCoy, J.L. Masonis, Surgical treatment of flexion contractures after total knee arthroplasty, *J. Arthroplast.* 22 (6 Suppl 2) (2007 Sep) 62–66.
- [9] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [10] Kubeš R, Salaj P, Hromádka R, Včelák J, Kuběna AA, Frydrychová M, et al. Range of motion after total knee arthroplasty in hemophilic arthropathy. *BMC Musculoskelet. Disord.* 2018 May 22 [cited 2020 Feb 29];19. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC5964921/>.
- [11] A.F. Kamath, J.G. Horneff, A. Forsyth, V. Nikci, C.L. Nelson, Total knee arthroplasty in hemophiliacs: gains in range of motion realized beyond twelve months postoperatively, *Clin. Orthop. Surg.* 4 (2) (2012) 121.
- [12] H.I. Balci, M. Kocaoglu, L. Eralp, F.E. Bilen, Knee flexion contracture in haemophilia: treatment with circular external fixator, *Haemoph. Off. J. World Fed. Hemoph.* 20 (6) (2014 Nov) 879–883.
- [13] D.E. Westberry, J.R. Davids, J.M. Jacobs, L.I. Pugh, S.L. Tanner, Effectiveness of serial stretch casting for resistant or recurrent knee flexion contractures following hamstring lengthening in children with cerebral palsy, *J. Pediatr. Orthop.* 26 (1) (2006 Feb) 109–114.