Case Report

Bilateral TKA for Charcot arthropathy associated with multiple levels of spinal canal stenoses: A case report and review of literature

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ARTICLE INFO

Article history:

Received 12 October 2016

Accepted 16 October 2016

Available online 28 October 2016

Keywords:

TKA

Knee

Charcot arthritis

Treatment

Spinal canal stenosis

ABSTRACT

We report a case of an 84-year-old male with multiple levels of canal stenoses who are diagnosed as Charcot arthropathy of bilateral knees. Although he did not feel any pain, recurrence of joint fluid collection and severe instability prevented him from standing and walking. Deficit in superficial sensation and bathyesthesia below the level of Th10, and tendon reflexes of extremities were seen. Romberg test was positive. Laboratory data showed no abnormal findings. We performed bilateral TKA based on the diagnosis of Charcot arthropathy. At 3-year follow-up, there is no complaint about joint instability and collection of joint fluid.

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1. Introduction

Charcot arthropathy is described by Charcot as a progressive destructive joint disease.¹ Unfortunately “painless joint” prevents us from noticing the existences of disease at early phase. Absence of appropriate nociception leads to excessive overload bearing or repetitive articular cartilage damage. Therefore, judging from relatively disease specific features such as joint instability and recurrent abundant joint fluid collection, Charcot arthropathy should be taken into account as soon as possible.

So far, total knee arthroplasty (TKA) was considered to be contraindication for treatment of Charcot arthropathy; because of poor survival rate of implant.² However, in terms of functional improvement, TKA could substitute to the other conservative treatments or arthrodesis.^{3–6}

Here we presented a case of bilateral Charcot arthropathy demonstrating severe joint instability and persistent joint fluid collection accompanied with multiple levels of spinal canal stenoses. Bilateral TKAs were performed. At 3-year post-operative follow-up, there is no complaint about joint instability, and activity of his daily life significantly improved.

Our patient accepted this submission for publication with his data.

2. Case presentation

An 84-year-old male with a long-term history of cervical disc herniation (CDH) at C6/7, ossification of posterior longitudinal ligament (OPLL) at Th9/10 and Th10/11, and lumbar canal stenosis (LCS) presented to our hospital. CDH and LCS were treated conservatively, and OPLL was treated surgically several years ago (Detail is unknown). He realized recurrent bilateral knee swelling without any pain 8 years ago, and has been treated at the hospital with occasional aspiration of joint fluid (over 100 ml each every time). He has been able to walk and work as a farmer without any difficulties. However, his condition gradually deteriorated, and finally he complained difficulty in keeping standing position and walking because of severe instability of bilateral knees. Then, he consulted our clinic.

On physical findings, apparent ballottement was seen in bilateral knees and aspirated over 100 ml of clear-yellowish joint fluid. The active range of motion (a-ROM) of right knee was $-20^{\circ}/120^{\circ}$, and that of left knee was $-10^{\circ}/125^{\circ}$ in flexion. There was no tenderness at joint spaces. Manual varus and valgus stress test showed apparent instability at $0^{\circ}/90^{\circ}$. As neurological findings, apparent deficit in superficial sensation and bathyesthesia below the level of Th10, and disappearance of bilateral tendon reflexes of upper- and lower extremities were seen. Romberg test was positive. The manual muscle test was power-full in both upper- and lower extremities. The time for 10-m walk took 62 s, however, it was securely supported by a Physical Therapist (PT) because it was impossible for him to walk by himself even if he uses two

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crutches (Video, 1). The Japan Orthopedics Association (JOA) score was 35 points in both knees. Laboratory data showed no abnormal values (Table 1). There was no evidence of syphilis and rheumatoid arthritis on serologic test.

Plain radiograph showed disappearance of joint spaces. Stress radiograph of right knee showed 3° in varus and 6° in valgus, and

Table 1

Laboratory data.

White blood cell count (4500–8500/ μ l)	6700	
Erythrocyte sedimentation rate (mm)	5/1h	17/2h
C-reactive protein (<0.2mg/dl)	0.09	
HbA1c (4.3–5.8%)	5.2

Fig. 1. (a) Cervical disc herniation at C6/7, (b) ossification of posterior longitudinal ligament at Th9/10 and Th10/11 and (c) severe lumbar canal stenosis.

Fig. 2. Plain radiograph. (a) Right knee (1: A-P view, 2: Lateral view, 3: varus stress, 4: valgus stress), (b) left knee (1: A-P view, 2: Lateral view, 3: varus stress, 4: valgus stress) and (c) bilateral rosembert view.

that of left knee showed 7° in varus and 11° in valgus (Fig. 2). On MRI of whole spine, cervical disc herniation at C6/7, OPLL at Th9/10 and Th10/11, and severe canal stenosis at L1/2–L5/S were seen (Fig. 1). On MRI, disappearance of articular cartilage, degeneration of medial and lateral menisci, and apparent joint fluid were seen (Fig. 3). According to these findings, we diagnosed his condition by exclusion as Charcot's arthropathy caused by multiple spinal canal stenoses, and performed bilateral TKA using semi-constrained prosthesis (Triathlon; Stryker, Allendale, New Jersey; total stabilized type) (Fig. 4). We examined the synovial tissue resected during the operation, and only chronic synovitis was pointed out.

At 3-year follow up, his posture is improved and his gait is steady using two crutches (Fig. 5) (Video 2). There is no complaint about pain, collection of joint fluid, and instability. The time for 10-m walk takes 31 s. A-ROM of right knee is $-10^\circ/125^\circ$ and that of left knee is $-5^\circ/125^\circ$. The JOA score is 65 points bilaterally. On plain radiograph shows neither loosening of prosthesis nor varus and valgus instability (Fig. 4).

3. Discussion

We described a rare case of Charcot's arthropathy caused by multiple levels of spinal canal stenoses, and was treated by bilateral TKAs.

Charcot's arthropathy is first reported by Charcot in 1868 as a case of arthropathy associated with tabes dorsalis.¹ Although the etiology is still unknown, based on absence of nociception, excessive load bearing or repetitive minor trauma subsequently leads to severe joint destruction with instability. Diabetes mellitus is the most common cause of Charcot's arthropathy. Besides, syringomyelia, leprosy,⁷ chronic alcoholism,⁸ trauma, and infection are also reported as underlying etiology. Despite its aspect of

severe joint destruction, the joints are painless. The diagnosis of neuroarthropathy is complicated because of the lack of any specific diagnostic test for this condition. In the current case, we considered that deficit of superficial sensation and bathyesthesia was caused by chronically compressed spinal cord at multiple levels, which were represented by disappearance of bilateral tendon reflexes of extremities and positive Romberg's sign. The therapeutical management for Charcot arthropathy is still controversial.^{9,10} So far, TKA is supported to be contraindication for the treatment of Charcot arthropathy without complete remission of the primary disease.² However, in terms of functional improvement, TKA could substitute to the others.^{3–6} Yoshino et al. and Bae et al. suggested using constrained type of prosthesis, and stressed patient education of joint protection is important for long-term survival.^{4,6} They also stressed that Charcot arthropathy has the possibility of developing early postoperative dislocation and to progress to symptomatic instability.^{3,5} Early diagnosis, appropriate timing, appropriate selection of prosthesis and operative technique are important.^{4,6}

So far, there is no report of bilateral Charcot arthropathy caused by multiple levels of spinal canal stenoses treated by bilateral TKAs. In this case, he could not neither keep standing nor walking because of severe bilateral knee joints instability. Judging from positive Romberg's sign, the loss of nociception could be compensated by ocular vision. Therefore, we focused on improving the joint instability and performed bilateral TKAs simultaneously. Even the condition of multiple levels of spinal stenosis still remained, we considered that improvement of dynamic stability of knee joints improving his gait.

Unfortunately "painless joint" prevents us from noticing the existence of disease, the joints are severely destroyed at first presentation. Judging from relatively disease specific features such

Fig. 3. MRI of the right knee. (a) T2 weighted image (WI), (b) T1WI, (c) T1WI fat suppression (Upper: Coronal view, Lower: Sagittal view).

Fig. 4. Plain radiograph after total knee arthroplasties.

Fig. 5. (a) Preoperative posture and (b) postoperative posture.

as severe joint instability and recurrent abundant joint fluid collection, Charcot arthropathy should be taken into account as soon as possible. In this case, fortunately the joints deformity was not so severe. However we selected constrained type of prosthesis concerning about his age, daily activity, and postoperative loosening. High frequency of serious complications including periprosthetic fracture, aseptic loosening, instability, and infection are still remained even if we used constrained prosthesis in a long-term follow-up period. At 3-year post-operative follow-up, there is no complaint of joint instability, and subsequently activity of his daily life is significantly improved. Although there is no apparent loosening of prosthesis at this moment, we have to carefully follow-up.

Conflicts of interest

The authors have none to declare.

Acknowledgement

None declared.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.jor.2016.10.022](https://doi.org/10.1016/j.jor.2016.10.022).

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