ORIGINAL ARTICLE

Outcomes of cable fixation after Vancouver type B1 periprosthetic femoral fractures

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ABSTRACT

BACKGROUND: In this study, it was aimed to evaluate the patients who underwent cable plate fixation due to a Vancouver-type B1 periprosthetic femur fracture and their clinical results.

METHODS: Vancouver-type B1 patients who were operated on for periprosthetic fractures between 2014 and 2019 were investigated. Age, gender, body mass index (BMI), follow-up time, operation time, bleeding amount, non-union fracture, last surgery before fracture, the time between previous surgery and fracture, implant survival, patient survival, and complications were recorded. In addition, the postoperative clinical functions of these patients were compared.

RESULTS: 23 patients who met the study criteria (Vancouver type B1 fracture) were identified. The mean age of the patients was 60 (49–76) years, the mean BMI was 26.3 (17.5–40.7), and the postoperative mean follow-up period was 14 (6–36) months. Considering the gender distribution, there were 5 (22%) men and 18 (78%) women. The mean time between the last surgery before the fracture and the fracture was 6 months (0–30). While the mean operation time was 95 min (60–180), the average amount of bleeding was 310 mL (150–600). Functional evaluations of patients: In total, five patients had decreased ambulatory abilities after surgery. Nonunion was observed in 2 patients during the follow-ups, and these patients underwent open surgery for treatment.

CONCLUSION: Cable and locking plate applications are successful in Vancouver type B1 fractures, which are one of the most common forms of periprosthetic fractures. In this technique, the duration of the operation can be shortened under ideal conditions, and the need for blood and blood products is reduced as blood loss is reduced. If there is a complication, you still have the chance to treat it with the option of revision arthroplasty.

Keywords: Cable and plate; outcome; periprosthetic fractures; Vancouver type B1.

INTRODUCTION

The number of hip arthroplasties applied with each passing year is increasing as a result of the increase in life expectancy in society and the widespread use of treatment services. Therefore, the number of periprosthetic fractures, which is one of the complications that can be seen after hip arthroplasty, is also increasing.[1,2] Incidences ranging from 0.1% to 18% have been reported.[2,3] These wide incidence ranges are directly related to the increasing population living with total hip arthroplasty (THA) and the varying follow-up times of studies. Risk factors for periprosthetic fractures include osteoporosis, mal-aligned stems, osteolysis due to wear of the bearing surfaces, stress shielding, an incomplete cement mantle, and cementless components.[1,4] There is a shift toward cementless components, even among the elderly and osteoporotic individuals. Cementless components offer certain advantages for sure: avoiding cement's systemic complications, shorter operation time, easier component positioning, and easier revision. All these advantages come with a very important risk; increased periprosthetic fracture.[5] These fractures may occur intraoperatively and are managed simultaneously. In most

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cases, these fractures are occult and get displaced as patients begin weight-bearing. The component itself may act as a stress riser and cause fractures years after surgery without significant trauma. The recommended treatment for Vancouver type B1 fractures in which the femoral stem is stable is open reduction and internal fixation (ORIF).[6-8] The classification of periprosthetic fractures was made by Duncan and Masri, and more than 80% are Vancouver type B, that is, fractures around the femoral component. In fractures with aseptic loosening and femoral bone defects, it is necessary to revise the femoral component. Despite the high rate of bone union after surgery, patients cannot return to their previous clinical functions. The aim of this study is to share clinic experience with the fact that type B's are more common among periprosthetic fractures, arthroplasty operations are performed intensively in our clinic, and these fracture surgeries have variable results.

A retrospective study was designed to see if the cable-plate structures were sufficient to treat these patients. The aim of this study was to evaluate the patients who underwent cable plate fixation in Vancouver type B1 periprosthetic femur fractures and their clinical results.

MATERIALS AND METHODS

Patients who underwent surgery for periprosthetic fractures in the orthopedics and traumatology clinic of our hospital between 2014 and 2019 were scanned from the file archive system. The medical records for each patient were obtained. Approval was obtained from the local ethics committee of our institution for our study, which was planned retrospectively. (BUÜ.MS. Clinical Research Ethics Committee 2021-6/46).

The inclusion criteria were to have a Vancouver-type B1 periprosthetic fracture and to be operated on using internal fixation with cable and locking plates. Patients who used allografts or double plates were excluded from the study. Because when it comes to the use of grafts or double plates, the success of cable and locking plates cannot be evaluated.
Age, gender, body mass index (BMI), follow-up time, operation time (the time between the incision made after anesthesia and skin closure was determined as the operation time), bleeding amount (the amount of bleeding was taken from the postoperative anesthesia forms), non-union fracture, last surgery before fracture, the time between last surgery and fracture, implant survival, patient survival, and complications were recorded. Fracture union was defined as the patient's ability to fully bear weight with or without assistance and evidence of callus bridging the fracture on both anteroposterior and lateral radiographs.[1] The Vancouver classification system, which is widely accepted in the literature, was used for the classification of periprosthetic fractures.[9] It has proved to be quite practical due to its reliability and high validity. Type B fractures include those around or just below the stem. These are also sub-classified: type B1 fractures occur around a well-fixed stem. Long-locking plates were used next to the femoral component and the distal part of the fracture to fix the fracture. Locking screws were used at the distal end, and cables were used proximally to fix the plate to the bone. Stability or implant loosening evaluation in patient follow-ups was performed according to the femoral component stability evaluation criteria of Engh et al.[10] Functional evaluations of the patients were made according to their ambulatory abilities before surgery and at the last follow-up. It was determined whether the patient's ambulatory abilities progressed or regressed by questioning the unsupported walking, walking distance, and the need for pain medication.

Surgical Technique

Preoperative infection is excluded, and the revision hip prosthesis kit is available in the operating room.[11] After the incision, tissue samples were taken for a frozen study and a microbiological culture study. If the frozen study was not compatible with infection, antibiotic prophylaxis was performed, and the operation was continued. Great emphasis was placed on minimal soft tissue damage at every stage of the surgery. Because soft-tissue damage will affect healing and recovery, as well as increase the risk of infection. The stability of the hip joint and femoral shaft was carefully examined. To be sure, pathological movement was examined with fluoroscopy control in some patients. After making sure of the strength of the prosthesis, the fracture was openly reduced. Due to the stem, it was fixed with cables proximal to the fracture line and screws distal. The length of the plate (Orthopro Med. Plate, Türkiye) applied was decided according to the plate screw osteosynthesis principles in the large load-bearing bones. Plates with a length of at least 3 cables or double cortex screw fixation in the proximal and distal of the fracture were selected. All mobile parts that could be changed during the operation were also replaced. After fixation, recheck fracture stability and check for bleeding. After making sure of the stability, the surgeon proceeds to soft tissue closure. Surgeons give patients low-molecular-weight heparin for 4 weeks for thromboembolism prophylaxis. If there is no contraindication, the surgeon will add 4 mg of Vancomycin perioperatively to the wound in all patients.

After the operation, 2 doses of 1 g of Vancomycin antibiotherapy were applied to the patients until the antibiograms taken from the operation area during the operation were finished. While postoperative mobilization is done according to the personal evaluation of the patient, our goal is to mobilize it as soon as possible. We show the radiological examinations of the two cases included in the study in Figures 1 and 2.

RESULTS

Thirty-eight patients had undergone surgery for periprosthetic fractures during the study period in our clinic. 23 patients who met the study criteria (Vancouver type B1 fracture) were identified. Fifteen patients without Vancouver type B1 were excluded from the study. As seen in Table 1, the mean age of the patients was 60 (49–76) years, the mean BMI

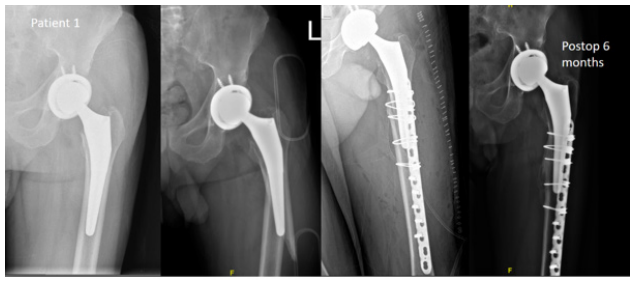

Figure 1. A 65-year-old male patient underwent total hip arthroplasty for primary coxarthrosis. He had a Vancouver type B1 periprosthetic fracture after a fall 2 months after the operation. Cable-plate fixation application to the patient and the radiograph showing the union after 6 months.

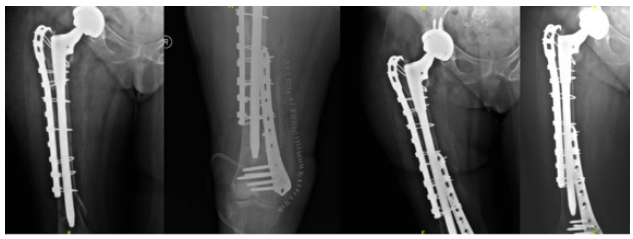

Figure 2. A 76-year-old female patient falls 1 month after revision hip replacement surgery and has a Vancouver type B1 periprosthetic fracture. Cable-plate fixation is applied to the patient. The patient, who was followed up for 1 year, died due to heart diseasesfor primary coxarthrosis. He had a Vancouver type B1 periprosthetic fracture after a fall 2 months after the operation. Cable-plate fixation application to the patient and the radiograph showing the union after 6 months.

was 26.3 (17.5–40.7), and the postoperative mean follow-up period was 14 (6–36) months. Looking at the gender distribution, it was 5 (22%) men and 18 (78%) women.

The average time between the last operation before the fracture and the fracture was 6 months (0–30). Final operation diagnosis of patients before periprosthetic fracture: revision was THA in 9 patients, fracture fixation in 8 patients, and primary THA in 6 patients. While our operation time was 95 min (60–180) on average, our bleeding amount was 310 mL (150–600) on average. Functional evaluations of patients: five patients had decreased ambulatory abilities after surgery. They had to use a walker or cane support. Other patients were able to achieve clinical conditions close to their preoperative ambulatory abilities after the follow-up period.

Nonunion was observed in 2 patients during follow-up. One of these patients was diagnosed with nonunion with disruption of the femur alignment on the X-ray taken 8 months after the operation, one of the cables being broken, pseudounion, and hypertrophic callus seen in the X-ray. The patient was re-operated 1 month after the diagnosis of non-union. A long revision stem and plate were applied. The other patient who was diagnosed with non-union was also a patient with a deep surgical site infection and developed a fistula on the operation site in the 5th month postoperatively. The patient was operated on with a diagnosis of a deep infection. The plaque was removed, and antibiotic-cemented cement was placed. Antibiotherapy was applied by the growths in the antibiogram. The patient, whose infection parameters came, was re-operated 2 months later. A double plate was applied to the femur medially and laterally. The patient, who continued anti-biotherapy for 1 month after the revision, did not show any signs of infection after discharge. Bone union was observed during follow-up. Prosthesis dislocation was observed 1 month after the operation due to periprosthetic fracture in 1 patient with a long-stem lifted revision hip prosthesis and cemented acetabular component. The prosthesis of the patient, who had no history of trauma, was closed in the operating room on the same day after anesthesia. No re-dislocation was observed during the follow-up with the patient. In both of our patients who developed the superficial infection, growth was observed in the material taken during surgery. They were treated with intravenous antibiotics, followed by oral antibiotics. Surgical intervention was not required in patients who developed superficial surgical site infections. When looking at implant survival, it was observed in 1 patient that 1 cable in the proximal plate of the plate failed in the 8th-month follow-up. Plaque failure was not observed in any of the patients. When looking at the 1st-year survival rates of our patients, 2 patients (8.7%) died due to heart diseases.

DISCUSSION

Cable and locking plate treatment applied in Vancouver-Type B1 fractures, which is the most common periprosthetic fracture, is successful and generally affects the clinical and radiological recovery data of the patient. This method, which is not completely far from complications, is still one of the safest revision methods.

Cable-plate construction provides stable fixation and successful fracture healing at Vancouver type B1 periprosthetic fractures.[12] Surgical treatment of periprosthetic fractures is difficult due to complex fracture configurations, prosthetic stability problems, and/or possible bone losses.[13] Cable fixation has no standardized technique, and success depends on surgeons' experience. The surgeon can provide stability in the area with a cable, but he cannot assign suitable screws due to the stem. Tsiridis et al. showed in their study that ORIF is the right treatment option for Vancouver type B1 fractures.[13]

Treatment is based on fracture type, implant stability, and bone stock. ORIF may be preferred. The classification should be done carefully and accurately for treatment success. The stem must be stable so that osteosynthesis is successful. Otherwise, you need to perform revision hip replacement surgery. Before the operation, the patient's anamnesis, type of trauma, and the presence of pain before the fracture should be investigated in detail. In aseptic loosening, the patient has pre-fracture pain complaints or complaints due to movement while standing up from a chair.[6] In addition, roentgenograms

Table 1. The parameters investigated in the patients in the study group

Patient	Age	Gender	BMI	Follow-up time (month)	Operation time (min)	Bleeding (cc)	Last surgery before surgery	Time between last surgery (month)	Implant survival	Patient survival	Complications	Functional evaluations	Union time (month)
1	65	Male	26.3	11	75	150	Primary THA	2	Survived	Living	None	Increased	3
2	49	Female	22	11	150	330	Primary THA	0	Survived	Living	None	Increased	4
3	50	Female	32	14	65	200	Primary THA	0	Survived	Living	None	Increased	3
4	51	Male	25	6	180	450	Revision	5	Survived	Living	Infection	Decreased	5
5	70	Female	23	12	90	300	Revision	20	Survived	Living	Infection	Decreased	5
6	53	Female	26.3	25	60	450	Fracture fixation	8	Revised	Living	Non union	Decreased	11
7	60	Female	25	16	180	600	Fracture fixation	3	Revised	Living	Non union, infection	Decreased	10
8	57	Female	23	6	120	320	Revision	1	Survived	Living	None	Increased	3
9	60	Female	27	13	95	250	Fracture fixation	0	Revised	Living	None	Increased	4
10	63	Female	21	7	60	150	Revision	19	Survived	Living	None	Increased	4
11	76	Female	23	14	60	200	Fracture fixation	0	Survived	Living	None	Increased	3
12	67	Female	17.5	7	85	250	Revision	1	Survived	>1 year died	None	Increased	5
13	76	Female	33.3	14	65	300	Fracture fixation	20	Survived	Living	None	Increased	4
14	49	Female	40.7	14	60	350	Revision	0	Survived	Living	Dislocation	Decreased	3
15	73	Female	27.1	32	60	250	Primary THA	1	Survived	Living	None	Increased	5
16	60	Female	19.8	25	100	200	Primary THA	19	Survived	Living	None	Increased	4
17	51	Female	32	18	120	350	Fracture fixation	3	Survived	Living	None	Increased	4
18	76	Female	33	14	100	320	Revision	1	Survived	>1 year died	None	Increased	3
19	74	Female	28	6	120	300	Fracture fixation	30	Survived	Living	None	Increased	3
20	49	Female	23	15	60	250	Primary THA	0	Survived	Living	None	Increased	4
21	50	Male	26.3	36	60	300	Revision	2	Survived	Living	None	Increased	3
22	51	Male	25	6	120	450	Revision	2	Survived	Living	None	Increased	4
23	50	Male	27	6	100	400	Fracture fixation	1	Survived	Living	None	Increased	3

BMI: Body mass index; THA: Total hip arthroplasty.

should be retrospectively examined, and signs of osteolysis or radiolucent areas around the implant should be investigated.[2] The lucent area can be 1–2 mm around the stem. It refers to the relaxation of varus deformities that progress in the stem. In addition, stem stability can be examined perioperatively, and a fluoroscopic evaluation can be made. If acetabular stability is suspected, an arthrotomy should be performed and checked.

Strut grafts are used in some studies to increase stability.[14] Post-fixation stability was assured in the perioperative examinations of our patients. Since the graft was not applied, the complications that may arise from the grafts were eliminated. The common notion is that locked plating results in higher non-union and reoperation rates when compared to ORIF with cable and plating or only cable fixation. Parvizi et al. reported that the caple-plate-screw application was successful in stem-stable periprosthetic fracture treatment.[15] Cable fixation shows a similar complication rate to other procedures, but it is an easier technique. An easier technique has the advantage of a shorter operation time, which is likely to cause less blood loss, mortality, and morbidity.

The rate of periprosthetic fractures after cementless hip prostheses is higher those those of cemented ones.[16] Since some studies gave post-treatment complications of all periprosthetic fractures, the rate may be high.[16,17] For example, in the study of Parvizi et al., 29 complications were identified in 67 patients.[15] In addition, fewer postoperative complications were encountered as Vancouver-type B1 fractures were included in the study. At the same time, since these patients are generally old and have other diseases, frequent complications after periprosthetic surgery are common.[17] In our study group, superficial surgical site infection was observed in two patients, non-union with deep surgical site infection in one patient, isolated non-union in one patient, and dislocation in one patient who was operated on for single-cable rupture and re-revision. Also, the inclusion of only Vancouver-type B1 fractures is the strength of the study. In addition, fewer postoperative complications were encountered as Vancouver-type B1 fractures were included in the study. The cases in the study were treated in a single center. In addition, the same type of fracture was treated with similar methods by the same team in this patient group. This study has some limitations. There is no information about the functional status of the patients before the fracture, and an assessment of the patients' pain status was not used.

CONCLUSION

Our study shows that cable and locking plate applications are successful in Vancouver-type B1 fractures, which are one of the most common forms of periprosthetic fractures. In this treatment method, which stands out due to reasons such as short operation time and low blood loss, the revision arthroplasty option continues in case of complications. Prospective randomized studies with a larger patient sample are required to comment on which procedure is ideal for the treatment of Vancouver-type B1 fractures.

Ethics Committee Approval: This study was approved by the Bursa Uludag University Ethics Committee (Date: 26.05.2021, Decision No: 2021-6/46).

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Conflict of Interest: None declared.

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REFERENCES

1. Chakrabarti D, Thokur N, Ajnin S. Cable plate fixation for Vancouver Type-B1 periprosthetic femoral fractures-our experience and identification of a subset at risk of non-union. Injury 2019;50:2301–5. [CrossRef]
2. Pike J, Davidson D, Garbuz D, Duncan CP, O'Brien PJ, Masri BA. Principles of treatment for periprosthetic femoral shaft fractures around well-fixed total hip arthroplasty. J Am Acad Orthop Surg 2009;17:677–88.
3. Matharu GS, Pynsent PB, Dunlop DJ, Revell MP. Clinical outcome following surgical intervention for periprosthetic hip fractures at a tertiary referral centre. Hip Int 2012;22:494–9. [CrossRef]
4. Franklin J, Malchau H. Risk factors for periprosthetic femoral fracture. Injury 2007;38:655–60. [CrossRef]
5. Garbuz DS, Masri BA, Duncan CP. Periprosthetic fractures of the femur: Principles of prevention and management. Instr Course Lect 1998;47:237–42.
6. Fleischman AN, Chen AF. Periprosthetic fractures around the femoral stem: Overcoming challenges and avoiding pitfalls. Ann Transl Med 2015;3:234.
7. Ricci WM, Bolhofner BR, Loftus T, Cox C, Mitchell S, Borrelli J Jr. Indirect reduction and plate fixation, without grafting, for periprosthetic femoral shaft fractures about a stable intramedullary implant. J Bone Joint Surg Am 2005;87:2240–5. [CrossRef]
8. Lever JP, Zdero R, Nousiainen MT, Waddell JP, Schemitsch EH. The biomechanical analysis of three plating fixation systems for periprosthetic femoral fracture near the tip of a total hip arthroplasty. J Orthop Surg Res 2010;5:45. [CrossRef]
9. Brady OH, Kerry R, Masri BA, Garbuz DS, Duncan CP. The Vancouver classification of periprosthetic fractures of the hip: A rational approach to treatment. Tech Orthop 1999;14:107–14. [CrossRef]
10. Engh CA, Massin P, Suthers KE. Roentgenographic assessment of the biologic fixation of porous-surfaced femoral components. Clin Orthop Relat Res 1990;257:107–28. Erratum in: Clin Orthop 1992;284:310–2.
11. Berbari E, Mabry T, Tsaras G, Spangehl M, Erwin PJ, Murad MH, et al. Inflammatory blood laboratory levels as markers of prosthetic joint infection: A systematic review and meta-analysis. J Bone Joint Surg Am 2010;92:2102–9. [CrossRef]
12. Patsiogiannis N, Kanakaris NK, Giannoudis PV. Periprosthetic hip fractures: An update into their management and clinical outcomes. EFORT Open Rev 2021;6:75–92. [CrossRef]
13. Tsiridis E, Krikler S, Giannoudis PV. Periprosthetic femoral fractures: Current aspects of management. Injury 2007;38:649–50. [CrossRef]
14. Sandhu R, Avramidis K, Johnson-Nurse C. Dall-Miles cable and plate fixation system in the treatment of periprosthetic femoral fractures: A re-

view of 20 cases. J Orthop Surg (Hong Kong) 2005;13:259–66. [CrossRef]
15. Parvizi J, Rapuri VR, Purtill JJ, Sharkey PF, Rothman RH, Hozack WJ. Treatment protocol for proximal femoral periprosthetic fractures. J Bone Joint Surg Am 2004;86-A Suppl 2:8–16. [CrossRef]
16. Füchtmeier B, Galler M, Müller F. Mid-term results of 121 periprosthetic femoral fractures: Increased failure and mortality within but not after one postoperative year. J Arthroplasty 2015;30:669–74. [CrossRef]
17. Bhattacharyya T, Chang D, Meigs JB, Estok DM 2nd, Malchau H. Mortality after periprosthetic fracture of the femur. J Bone Joint Surg Am 2007;89:2658–62. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZ*

Vancouver tip B1 Periprostetik femoral kırıklardan sonra kablo sabitlemenin sonuçları

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AMAÇ: Bu çalışmada Vancouver tip B1 periprostetik femur kırığı nedeniyle kablo plak fiksasyonu yapılan hastaları ve klinik sonuçlarını değerlendirilmesi amaçlandı.

GEREÇ VE YÖNTEM: 2014-2019 yılları arasında periprostetik kırık nedeniyle opere edilen vancouver tip B1 hastaları araştırıldı. Hastaların; yaşı, cinsiyeti, vücut kitle indeksi, takip süresi, ameliyat süresi, kanama miktarı, non-union oranları, periprostetik kırık öncesi son ameliyatları, son ameliyat ile periprostetik kırk arası geçen süre, implant sağ kalımı, hasta sağ kalımı ve komplikasyonları kaydedildi. Ayrıca bu hastaların postoperatif klinik fonksiyonlarını da karşılaştırıldı.

BULGULAR: Çalışma kriterlerini (Vancouver tip B1 kırığı) karşılayan 23 hasta belirlendi. Hastaların yaş ortalaması 60 (49-76), ortalama vücut kitle indeksi 26.3 (17.5-40.7) ve ameliyat sonrası ortalama takip süresi 14 (6-36) aydı. Cinsiyet dağılımına bakıldığında 5 (%22) erkek ve 18 (%78) kadındı. Kırık öncesi son ameliyat ile kırık arasındaki ortalama süre 6 ay (0-30) idi. Ameliyat süresi ortalama 95 dakika (60-180) iken kanama miktarı ortalama 310 ml (150-600) idi. Hastaların fonksiyonel değerlendirmeleri; Toplamda beş hastada ameliyattan sonra ambulatuar yetenekleri azalmıştı. Takiplerde 2 hastada non-union gözlendi ve bu hastalara tedavi için açık cerrahi uygulandı.

SONUÇ: Periprostetik kırıkların en sık görülen formlarından biri olan Vancouver B1 tipi kırıklarda kablo ve kilitli plak uygulamaları başarılıdır. Ameliyat süresinin kısa olması ve kan kaybının az olması gibi nedenlerle öne çıkan bu tedavi yönteminde komplikasyon durumunda revizyon artroplasti seçeneği devam etmektedir

Anahtar sözcükler: Kablo ve plak; sonuçlar; periprostetik kırık, Vancouver tip B.

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