Total Hip Arthroplasty Periprosthetic Femoral Fractures
A Review of Classification and Current Treatment

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Abstract
Periprosthetic fractures of the femur after total hip replacement can present some unique challenges to the treating reconstructive orthopedic surgeon. Treatment may differ depending on fracture location, bone condition, implant stability, patient characteristics, and surgeon experience. It is imperative that adequate and sufficient mechanical fixation be achieved in the treatment of these patients. It is crucial that the treating orthopaedic surgeon have a clear and effective treatment plan to manage these complex cases. The patient’s final outcome is dependent on fracture union, implant stability, early functional recovery, and return to pre-injury independence. This review presents an overview of the current diagnostic and treatment approaches, with the goal of providing a template for optimal decision-making when dealing with these complex injuries.

Total hip arthroplasty (THA) has been an extremely effective procedure in relieving pain and dysfunction for patients with hip arthritis of varying etiologies. However, after many decades of successful total hip replacements, there has also been a substantial increase in the incidence of periprosthetic fractures following THA. This increase in fracture prevalence is attributed to the substantial increase in the number of primary and revision THAs being performed annually, the growing number of patients with a THA in place for more than 20 years, the aging population of THA patients (with increasing life expectancy, poorer bone quality, and high fall risk), and broader indications for THA that allow younger, more active, and consequently high-energy trauma prone patients to undergo the surgery.

Periprosthetic femur fractures are divided into intraoperative and postoperative fractures. Intraoperative fractures occur during the course of surgery and postoperative fractures, the main focus of this review, usually occur within days to several years after the procedure. In a Swedish National Hip Arthroplasty registry study, the mean time from THA to fracture was 7.4 years for primary THA and 3.9 years for revision THA.1 Also, in a Mayo Clinic Total Joint Registry study, average time between primary THA and fracture was 8.1 years.2

Periprosthetic femoral fractures may present many challenges to the reconstructive orthopedic surgeon. Such fractures can range from minor injuries, with minimal effect on the patient’s outcome to being catastrophic and possibly creating a non-reconstructable problem with a detrimental effect on the patient’s function. The economic impact and disabilities associated with femoral periprosthetic fractures can therefore be substantial. Thus, having a clear and effective treatment plan to manage these injuries is crucial for the treating physician.

Prevalence
The prevalence of postoperative periprosthetic femoral fractures ranges from 0.1% to 4% depending on the series reviewed, with higher rates after revision surgery.3–6 In a Mayo Clinic retrospective study of total hip arthroplasties performed between 1969 and 1990, the postoperative femoral fracture prevalence after 19,657 primary THAs was 0.6%. The postoperative fracture prevalence for cemented primary arthroplasties was 0.6% of the 17,579 cemented primary arthroplasties and 0.4% of the 2,078 uncemented primary arthroplasties. In the revision arthroplasty group, the overall prevalence of postoperative periprosthetic fracture...
was higher at 2.4% of the 4,397 procedures performed, with 2.8% of fractures occurring in the 3,265 cemented revision cases and 1.5% of the 1,132 uncemented revision cases.2

Etiology
The main risk factor for sustaining a periprosthetic femur fracture is osteolysis associated with implant loosening.7 In both the Mayo clinic and Swedish registry studies, 94% and 70% of patients respectively had a loose stem prior to fracture.1,8 However, any pathologic process that weakens bone may contribute to these fractures. Examples include osteoporosis and other conditions with pathologic bone such as rheumatoid arthritis, Paget’s disease, and polyneuropathies. Tumors, cortical defects, trauma, revision surgery, extruded cement, stress risers, and varus stem position are all also significant risk factors for periprosthetic femoral fractures. Age, sex, and body mass index have not been shown in any large study to be a significant risk factor. The most frequent mechanism for sustaining these fractures is a low energy fall from sitting or standing, accounting for 75% of primary THA and 56% of revision THA periprosthetic fractures.8

Exam and Imaging
A detailed assessment of the patient prior to treatment is essential in order to maximize the chances of a good outcome. As previously stated, many periprosthetic femur fractures occur from low-energy trauma such as a fall from standing height. The treating physician must elicit from the patient’s history any signs and symptoms that may suggest implant loosening prior to the injury, such as thigh pain and start up pain, usually reported as pain while rising from a chair or at initiation of ambulation. A complete physical examination with an emphasis on the injured limb’s neurovascular status should be carefully documented. Physical examination may reveal inability to ambulate, tenderness to palpation of the fracture site, and pain with range of motion of the affected extremity. Preoperative planning should include identification of previous surgical scars and soft tissue condition, review of previous operative reports, especially for identification of the currently implanted prosthesis and any unusual intraoperative events, and appropriate workup if septic loosening is suspected. Patients with fractures around asymptomatic, well-fixed implants usually do not require an infectious workup. High-quality standard anteroposterior (AP) and lateral radiographs of the affected hip and femur together with an AP radiograph of the pelvis should be obtained. Images should be reviewed thoroughly to ascertain the type of fracture and the stability of the implant.

Signs of a loose femoral stem include continuous lucency at the cement-bone and cement-stem interfaces, as well as cement mantle fractures prior to incurring the periprosthetic fracture. Post-injury cement mantle fracture is not a sign of stem loosening by itself. Failure to identify an unstable implant is likely to lead to treatment failure if osteosynthesis rather than revision arthroplasty is performed. The stability and the condition of the acetabular component should be assessed as well, and if revision is warranted, it should be addressed appropriately. Routine use of CT or MRI is usually not warranted.

Classification
Several classification systems of periprosthetic fractures have been developed over the years.5,9-11 Most are descriptive and provide information about the location of the fracture but have no significant value with regard to aiding the formulation of a treatment strategy.

The Vancouver classification system proposed by Duncan and Masri is the most widely used system for classification of total hip periprosthetic femoral fractures, although initially developed for THAs with cemented femoral components.5 The Vancouver classification takes into account the three most important factors in management of these injuries: the site of the fracture, the stability of the femoral component, and the quality of the surrounding femoral bone stock (Fig. 1). In addition to being simple and reproducible, it is useful for devising a treatment strategy based on easily identifiable characteristics. In particular, the Vancouver classification helps the surgeon differentiate between a stable fracture and an unstable fracture, which requires osteosynthesis, as well

![Figure 1 The Vancouver classification of periprosthetic femur fractures around total hip arthroplasty. The classification is based on the location of the fracture, stability of the femoral implant, and quality of the surrounding bone stock.](image)
as a stable implant from an unstable implant, which requires revision. The Vancouver classification has been validated in several studies.\(^\text{12}\)

**Vancouver Classification**

Type A fractures include those involving the lesser trochanter (\(A_{\text{LT}}\)) (Fig. 2) or the greater trochanter (\(A_{\text{GT}}\)). These fractures are most commonly associated with osteopenia of the proximal femur.

Type B fractures occur around or just distal to the femoral stem. Type B fractures are further divided into subtypes: B1-adjacent to a well-fixed stem, B2-adjacent to a loose stem but with adequate bone stock, and B3-adjacent to a loose stem and associated with marked osteopenia and loss of bone stock. This sub-classification is critical to the decision making process of the treating physician because a fracture accompanied by a loose implant requires revision arthroplasty compared to osteosynthesis for fractures associated with a stable implant.

Type C fractures are far distal to the femoral stem, such that their treatment is independent of the total hip arthroplasty.

**Treatment**

Treatment of total hip periprosthetic femoral fractures is dependent on a few fracture characteristics such as fracture location, femoral bone stock, implant stability, patient’s characteristics like age and medical co-morbidities, and surgeon experience.

Historically, non-operative treatment was the mainstay for periprosthetic femoral fractures.\(^\text{13}\) With advances in surgical techniques and instrumentation, the balance has shifted in favor of surgical management, thus avoiding the recognized complications associated with prolonged recumbency such as thromboembolism, pneumonia, pressure ulceration and knee joint contractures. Nevertheless, non-operative treatment is still recommended for a subset of patients with otherwise operative fractures who are unable to tolerate a prolonged surgical procedure for medical reasons, especially if they are non-ambulatory and have low levels of physical function. There is no consensus regarding the use of skeletal or cutaneous traction preoperatively for periprosthetic femur fractures. The goals of surgery should be fracture union, prosthetic stability, anatomical alignment, rotation, and length, as well as return to pre-injury function. In cases of severe osteopenia, osteosynthesis with relative stability techniques, such as bridging of comminuted segments, should be employed. In cases where revision total hip arthroplasty is being contemplated as the treatment option, the possibility of infection should be considered and ruled out. Unfortunately, laboratory studies, such as white blood cell count, erythrocyte sedimentation rate, and C-reactive protein, are not as useful in the presence of a periprosthetic fracture compared to failed total hip arthroplasty without a fracture.\(^\text{14}\) A hip aspiration culture may, however, be helpful when septic loosening prior to fracture is suspected.

Many different treatment options have been described in the literature, and no single treatment has been shown to be the gold standard. The following is a presentation of common treatment options for each fracture type.

**Vancouver Type \(A_{\text{LT}}\)**

Type \(A_{\text{LT}}\) fractures are rare, and usually non-operative treatment is required, unless the fracture compromises the stability of the implant by involving a large portion of the calcar region with loss of the medial buttress (Fig. 3). In this case, treatment may include cerclage wiring and revision if the implant is deemed unstable.

**Vancouver Type \(A_{\text{GT}}\)**

Type \(A_{\text{GT}}\) fractures are usually stable, due to the composite tendons of the vasti and glutei muscles, and treatment for non-displaced fractures is non-operative, with protected weight bearing for 6 to 12 weeks and avoidance of hip abduction until fracture union is achieved.\(^\text{15}\) Displaced fractures may require fixation, either with a hook cable plate construct or cerclage fixation, in order to restore the functional leverage arm of the glutei muscles. Often, osteolysis of the proximal femur is associated with these type A fractures. In these cases, operative treatment is warranted and should include bone grafting of the osteolytic lesion, trochanteric fixation, and acetabular liner revision to address the underly-
Osteolysis is a frequent cause of osteolysis. In a study of with mean follow-up of 11 years, Hsieh and associates\textsuperscript{16} reported an incidence of greater trochanteric periprosthetic fractures as 2.6%. They also reported that these fractures all occurred in the presence of an osteolytic lesion 4 to 11 years postoperatively. Fifteen of 17 patients treated non-operatively for minimally displaced fractures healed clinically and radiographically by 6 to 8 weeks, but all fractures eventually healed without further displacement, as did all four patients that underwent operative treatment. Pritchett and coworkers\textsuperscript{15} showed that trochanteric fractures that have migrated less than 2 cm could be treated successfully non-operatively, and internal fixation should be considered in cases of displacement greater than 2.5 cm or when trochanteric nonunion results in pain, instability, or abduction weakness.

**Vancouver Type B**

Type B fractures represent approximately 80% of all cases. Sub-classification and treatment options depend on the morphology of the fracture, the stability of the femoral component, and the quality of the proximal femoral bone (Fig. 4).

At the time of surgery, the surgeon should be familiar and feel comfortable with the extensile approaches to the hip and femur. The surgeon should try to minimize soft tissue trauma when feasible and preserve blood supply to the fracture fragments by limiting surgical dissection. When using plate fixation, it is important to bypass the distal limit of the fracture by at least two femur widths. Biomechanical studies by Larson and colleagues showed that perforation of the femur led to a 44% reduction in the original strength of the femur and osteosynthesis with a plate that bridged the fracture area by two femur widths re-established the stability of the bone to 84% of its original strength.\textsuperscript{17} Intra-operative stability testing can be done without an arthrotomy, if the distal stem is exposed in the fracture site. However, if there is any doubt about the implant stability, intraoperative stability testing utilizing hip arthrotomy and dislocation is recommended.

**Vancouver Type B1**

Controversy still exists regarding the preferred fracture fixation technique for type B1 fractures, given the high stress location of these fractures and the femoral implant. In general, type B1 fractures should be treated with open reduction and internal fixation with or without cortical strut allograft based on the bone quality observed intraoperatively (Fig. 5). There are several options for internal fixation, most of which have shown good to excellent outcomes. Historically, these fractures were treated with stainless steel cerclage wires and open reduction and internal fixation with rigid dynamic compression plates.\textsuperscript{9,18-20} However, many studies have reported that cerclage wiring alone has a high failure rate, and proximal unicortical screws in dynamic compression plates, while more stable

### Table 1

<table>
<thead>
<tr>
<th>Type A</th>
<th>Type B</th>
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<tr>
<td>A\textsubscript{GT}</td>
<td>Minimal or no displacement</td>
</tr>
<tr>
<td>Displaced</td>
<td>Osteolysis</td>
</tr>
<tr>
<td>No Osteolysis</td>
<td>Fixation with cerclage wire or trochanteric claw plate system</td>
</tr>
<tr>
<td>Osteolysis</td>
<td>Fixation with cerclage wire or trochanteric claw plate system with bone grafting</td>
</tr>
<tr>
<td>Stable</td>
<td>Displaced medial cortex</td>
</tr>
<tr>
<td>Displaced</td>
<td>No Osteolysis</td>
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<tr>
<td>No Treatment</td>
<td>Cerclage wire</td>
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**Figure 3** Treatment algorithm for Vancouver type A periprosthetic femur fractures.
than cerclage wiring alone, are also inadequate.21-26 Also, when standard plates and screws are used, they tend to violate the cement mantle. Additionally, if a canal-filling uncemented stem is present, it may be difficult to insert screws around the implant, thereby compromising fixation strength. Therefore, as an alternative, plates that can accommodate cables and screws have been designed and are available from most implant manufacturers. The first of these cable-plate constructs was the Ogden plate, (Zimmer, Warsaw, IN) introduced in 1976, and best described as a metallic bone side plate that was secured to the proximal fragment by Parham bands and to the distal fragment by screws.27 The relative ease, minimal morbidity, and stability of this technique made it popular, but its disadvantages included the potential for stress risers as a result of the transcortical screws, fractures below the plate, prosthetic loosening, and nonunion.27 Therefore, many modifications on the same treatment modality have been developed since the introduction of this technique, as evident in the modern day cable plating systems. These plates can be used in isolation or may be augmented with cortical allograft struts, and they provide the surgeon with many options for securing the plate to the femur without interfering with the femoral implant or the cement mantle.

Some studies have shown that a trochanteric plate with proximal unicortical and distal bicortical screws or a plate with proximal unicortical screws combined with cerclage wires and distal bicortical screws are a sufficiently strong mechanical construct.21,28 Tadross and coworkers reported on seven periprosthetic femoral fractures treated with cable plates, of which three achieved union, two failed to unite, and two malunited in varus.29 In the Swedish Registry study, Lindahl and associates found the revision rate after internal fixation of Vancouver B1 periprosthetic fractures to be 59%. They reported that the strongest negative prognostic factor was the use of a single non-locked plate for fixation.1

The use of cortical strut grafts is, therefore, a good alternative or adjunct fixation method. Strut grafts, in the case of stable implants (type B1), may be used as the only means of stabilization with either a single strut or as a double strut...
complex in a 90° or 180° to each other or in combination with osteosynthesis (Fig. 6). Strut grafts have an advantage of being a biological and osteoconductive osteosynthesis technique, providing reduced stress shielding due to similar modulus of elasticity as the native bone, and augmenting host bone stock and strength after union.\textsuperscript{12,21,30-32} Placing two strut grafts with three fixation points above and below the fracture have been shown to yield good outcomes.\textsuperscript{33,34} Emerson and colleagues reported a 96.6\% incorporation rate in 63 cases were strut grafts were used, with a high rate of fracture healing.\textsuperscript{35}

In a multicenter study of 40 type B1 periprosthetic fractures, Haddad and coworkers treated 19 patients with cortical strut onlay grafts alone, while 21 patients were managed by a plate and one or two cortical struts. Union occurred in 98\% of the fractures. There were four mal-unions, but all had less than 10° of malalignment, and the investigators suggested that cortical strut grafts should be routinely used in the treatment of these periprosthetic fractures. They also suggested that combined plating with proximal cable fixation augmented with an anterior or medial strut graft may provide better fixation than an allograft strut alone.\textsuperscript{30} Biomechanical studies by Dennis and associates demonstrated that plates with proximal unicortical screws or unicortical screws and cerclage, as well as distal bicortical screws, achieved a significantly more stable osteosynthesis than plates with cerclage alone, plates with just proximal cerclage and distal bicortical screws (Ogden construct) or two strut grafts (SGs) with cerclage alone.\textsuperscript{22} The disadvantages of strut grafts are their high cost, limited availability, increased danger of infection, and potential for transmitting disease. In addition, remodeling occurs subsequent to the initial incorporation of the strut graft, and this leads, in turn, to biomechanical weakness during the first 4 to 6 months following grafting.

The recent introduction of locking plates has provided another excellent alternative for fixation of these fractures. These plates use screws that lock into the plate allowing multiple points of unicortical or bicortical fixation. These plates have the advantage of increased axial and angular stability, indirect fracture reduction, less soft tissue dissection, preservation of periosteal blood supply, strong fixation in bone of poor quality, and less damage to cement mantle or stable implant due to possibility of multiple proximal unicortical fixation points. In a biomechanical study comparing the locking plate and Ogden construct, Fulkerson and coworkers reported locking plates to be stiffer than the Ogden construct in pre- and post-cyclic axial loading and torsion.\textsuperscript{36} The investigators concluded that locked plating is not mechanically superior compared to conventional plating although it does offer the advantages of minimally invasive

**Figure 5 A.** A radiograph of a Vancouver type B1 femur fracture, with a fracture at the level of the tip of the stem with a stable implant. **B.** This fracture was treated with open reduction and internal fixation with a locked plate construct using unicortical screws proximally and bicortical screws distally.

**Figure 6** Clinical photograph of a periprosthetic femur fracture with a fixation construct utilizing a strut allograft and plate fixation with locked screws and cerclage wires.
fixation techniques. Another biomechanical study by Choi and colleagues compared the strength of three constructs for treating comminuted type B1 fractures and found that a double anterior and lateral locked plates construct is stronger than the lateral plate and anterior strut allograft construct, which in turn was stronger than a single lateral locking plate construct.37 A few studies have shown excellent outcomes with use of locking plates either in isolation or augmented with cerclage wires and strut allografts.38-40 In summary, it would, therefore, seem logical to combine a plate, locked or non-locked, with distal bicortical screw fixation and proximal unicortical screw fixation supplemented with an onlay cortical strut allograft fixed by cables. Locking screws may, however, be preferred in patients with poor bone quality.

**Vancouver Type B2**

Revision arthroplasty is the treatment of choice when the prosthesis is loose or fractured. Duncan and Masri reported that 82% of type B fractures occurred in the presence of a loose implant.5 Bethea and coworkers reported that 75% of all postoperative femoral fractures are related to loose implants.9 Therefore, a majority of all periprosthetic femur fractures are either type B2 or B3. When considering type B2 fractures, some questions that need to be addressed include how long the femoral prosthesis should be, cemented versus non-cemented stem, cerclage wires or plates for fracture reduction, and if strut allograft will be used to augment the fixation. The most commonly recommended fixation for type B2 fractures is revision with a long femoral stem, effectively bypassing the fracture by a minimal distance of two femoral diameters with at least 5 cm of diaphyseal fit.2,5,17 The disadvantage of a cemented implant is the possible excursion of the cement into the fracture site, which can impede fracture union and healing.

Cementless implants with distal fixation have an advantage of bypassing the fracture site and having their point of fixation outside the area of injury. This allows the fracture to be fixed around the stem, with cables, struts, and plates (Fig. 7). Fracture fragments should be separated to enable canal debridement and reaming to provide adequate implant fit in patients treated with long stem bypass fixation. If rotational stability, soft tissue tensioning, or restoration of limb length are concerns, then a fluted modular noncemented stem may be considered. Strut allograft may be needed for preliminary stability of the construct in select cases, such as that of a rotationally unstable transverse fracture.

Sledge and associates proposed an algorithm for treatment of Vancouver type B2 fractures.41 They recommended that fracture fragments should first be reduced to reconstitute the proximal tube of the femur and held together with doubled 18 gauge cerclage wires. Once the new stem is in position, it is then stabilized by the addition of the allograft struts as needed.41

In cases where there is significant proximal bone deficiency in revision total hip arthroplasty, distally fixed porous-coated stems are used to gain intramedullary fixation for complex periprosthetic fractures. MacDonald and colleagues reported on 14 cases of postoperative fracture treated with extensively coated cementless stems, and all 14 fractures healed with no deformity at an average of 8.4 years status post-surgery.42 Tower and Beals studied 102 revisions for periprosthetic fracture of the femur from 30 surgeons and reported a 62% rate of complications for cemented revisions, with 38% loosening and 24% of other complications, such as infection, dislocation, or trochanteric nonunion.43 Cementless revisions were reported to have a 34% complication rate, with 18% rate of subsidence (some of which stabilized), 7%
rate of loosening, and 9% dislocation, trochanteric nonunion, or infection.\textsuperscript{43} Given the higher rates of complication with cemented techniques, changing to a cemented stem is generally only recommended for older patients with osteoporotic bones or patients with irradiated bone, in whom cementless fixation would be more challenging. When the patient is frail and elderly and could benefit from a quicker procedure, the cement-in-cement technique may be considered. The technique is indicated for non-comminuted fractures with well-fixed, good-quality cement mantles. The approach is faster and technically less demanding, resulting in theoretically less blood loss and lower risk of iatrogenic bone fragmentation during cement removal.\textsuperscript{44} The use of the cement-in-cement technique for femoral component revision has excellent clinical outcomes and long-term results, with survivorship of 98\% to 100\% at 5 to 15 years.\textsuperscript{44}

Another alternative for treating type B2 fractures is the use of cementless revision stems with distal interlocking screws. Mertl and coworkers retrospectively reviewed the use of interlocking stems in 725 patients with an average follow up of 4.5 years.\textsuperscript{45} The main advantages of these interlocking stems are initial axial and rotational stability and consistent bony in-growth due to the hydroxyapatite coating.\textsuperscript{45} In a study of 118 type B2 and type B3 fractures, different uncemented stems (a proximally porous coated uncemented stem, an extensively porous-coated stem, or an allograft prosthetic composite/tumor prosthesis) were implanted in different patients, Springer and coworkers found that the uncemented extensively porous coated implants had the most stable fixation and were not associated with any nonunions.\textsuperscript{46} In another study, Ko and colleagues followed 12 patients with type B2 fractures treated with the Wagner revision stem for an average of 58.5 months.\textsuperscript{46} All 12 patients were found to have stable prostheses and solid fracture union. In summary, type B2 fractures are complex procedures needing both stabilization of the fracture while also revising the femoral component.

**Vancouver Type B3**

Revision arthroplasty is the treatment of choice for type B3 fracture patterns. There are no major series of type B3 fractures in the literature. However, these are challenging cases with a high rate of complications. It is essential that the implant obtain adequate distal fixation to provide axial and rotational stability, as the proximal bone does not usually give sufficient support. In young patients, restoration of bone stock is a priority; therefore, an allograft-prosthesis composite is an attractive option.\textsuperscript{47} Wong and associates reported their experience with 15 type B3 fractures treated with an allograft-prosthesis composite, with a rate of healing of 93.3\%.

In older and low functional demand patients, a proximal femoral replacement or “megaprosthesis” may be used (Fig. 8). In contrast to an allograft composite, this option allows immediate weightbearing after surgery, which is an essential component of care for this population group.\textsuperscript{21} Because of soft tissue deficiency, a constrained acetabular liner may be needed to prevent instability. There are only scarce reports of treatment outcomes for Vancouver type B3 periprosthetic fractures. Proximal femoral replacement for these fractures has been shown to be effective with a 64\% survivorship at 12 years.\textsuperscript{48}

Impaction grafting and cemented stem fixation should be considered for select cases of femoral periprosthetic fractures, with significant comminution at or below the level of the femoral isthmus that can prevent achieving axial and rotational stability of a traditional long cementless porous-coated femoral stems. The advantages of long-stem cement-
Vancouver Type C

Surgical fixation is the treatment of choice for this pattern of fractures (Fig. 9). There are numerous types of fixation devices available to address these fractures including locking plates, screw and cable hybrid plates, and intramedullary devices. Our recommended implant of choice is a hybrid plate with unicortical screws and cable fixation proximally around the femoral stem and bicortical screws distal to the femoral stem (Fig. 10). Occasionally, a strut allograft may be used to provide a more stable construct. Care should be taken to avoid leaving a segment of weak, unprotected bone, between the intramedullary implant and the proximal end of the plate. Adequate overlap should be achieved to avoid such stress risers that may lead to a recurrent fracture.

The main concern with intramedullary nail fixation relates to the possibility of creating a stress riser between the tip of the nail and the femoral component. Fractures close to the tip of the stem may be treated with the same techniques as type B1 fractures.

Outcomes

Outcomes of periprosthetic femur fractures have been reported on by many investigators. Young and coworkers compared 232 periprosthetic femur fracture patients with matched patients who underwent total hip revision; they found a higher 6 month mortality rate (7.3% vs. 0.9%, p < 0.001) and higher likelihood of re-revision (7.3% vs.
2.6%, p = 0.06) in the periprosthetic fracture patients. The most common indications for re-revision were dislocation and re-fracture. Bhattacharyya and associates reported a 1 year mortality rate of 11% in patients treated operatively for periprosthetic femur fractures compared with 2.9% in patients who underwent primary joint replacement, and 16% among hip fracture patients. Revision arthroplasty for the treatment of type B periprosthetic fractures was associated with a one-year mortality rate that was three-fold less than that after surgical treatment with open reduction and internal fixation. Therefore, the investigators suggested that in instances when either treatment option is feasible, revision arthroplasty should be the preferred option.

Summary

The surgical advances achieved in the past years in femoral periprosthetic fracture care have significantly improved patient outcomes. The current standard treatment for most periprosthetic femoral fractures is surgical with osteosynthesis or revision arthroplasty. Consequently, it is essential to correctly classify the type of fracture and the stability of the prosthesis as failure to identify an unstable implant is likely to lead to treatment failure if osteosynthesis rather than revision surgery is performed.

Poor cortical bone quality is a common finding among patients presenting with total hip periprosthetic femoral fractures, thus it is imperative that adequate and sufficient mechanical fixation be achieved in the treatment of these patients. The patient’s final outcome is dependent on early functional recovery and return to pre-injury independence. Routine radiological follow-up of high-risk patients may help to identify loose implants and enable early intervention prior to fracture occurrence. With an expected rise in the prevalence of periprosthetic fractures, further advancements in surgical management of these complex patients are warranted.

Disclosure Statement

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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