Overview of Complications of Total Knee Arthroplasty

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Over the past two decades, total knee arthroplasty has evolved into a procedure with reliable and predictable results. The reported 10- to 15-year survivorship of a total knee replacement is as high as 95% to 98%.1-3 Refinements in prosthetic designs, recognition of the importance of ligamentous balancing, and modifications in instrumentation to achieve appropriate alignment contribute to the improved success rate. Despite the improvement in surgical outcome, however, complications continue to occur.

An understanding of the potential complications and pitfalls of primary and revision total knee reconstruction is essential for prevention. The common complications of total knee arthroplasty include infection, loosening, thromboembolism, arthrofibrosis, peri-prosthetic fracture, extensor mechanism dysfunction, and bone loss. There are also neurovascular and wound-related complications.

This chapter reviews the common complications and pitfalls of total knee replacement procedures. For each complication, the incidence, etiology, predisposing risk factors, and management options are discussed.

Soft Tissue Complications

The incidence of wound-related complications following primary and revision total knee arthroplasty is reported to be as high as 10% to 22%.4 Types of wound problems include delayed wound healing, prolonged or persistent drainage, hematoma, superficial infection, and necrosis. The significance of wound healing problems is that they lead to an increased risk of developing deep infection; 17% to 50% of prosthetic infections are associated with a history of prolonged wound drainage.5

Compared to the hip, the knee is a superficial joint with a relatively thin soft tissue envelope. The superficial nature of the joint can complicate an otherwise minor wound problem. In addition, the knee has a unique vascular anatomy. The blood supply to the soft tissues of the anterior knee is random and arises from the contributions of multiple vessels. An anastomosis of arteries forms a ring around the patella.6 Arising from the popliteal artery, the inferior and superior genicular arteries supply terminal branches to the anastomotic ring. Additional arteries contributing branches to the ring include the lateral circumflex femoral, a branch of the profunda femoris artery; the supreme genicular, from the superficial femoral artery; and the anterior tibial recurrent, from the superficial femoral artery; and the anterior tibial recurrent, from the tibial artery.7

The blood supply to the skin of the lower extremity typically arises from direct cutaneous vessels, musculocutaneous perforators, and fasciocutaneous perforators.8 However, the anterior knee does not have intermuscular septa or muscles to provide arterial perforators to the skin. In addition, except for the medial saphenous region of the knee, there are no direct cutaneous vessels.9 The arterial blood supply is not located superficially near the dermis.10 Anteriorly, the circulation of the skin is dependent on the dermal plexus. This plexus originates from arterioles traveling with the subcutaneous fascia.5 Undermining the subcutaneous layer and raising skin flaps superficial to this fascia can disrupt skin circulation and potentially lead to wound compromise.4 To preserve skin circulation, it is recommended to leave the fascia attached to the subcutaneous layer.

Choosing the appropriate skin incision is important to reduce the risk of developing a wound complication. Midline skin incisions are generally the least disruptive to the blood supply.4,5 The appropriate incision for pri-
mary and revision arthroplasty is one that allows sufficient exposure but avoids the creation of hypovascular flaps. Patients at greatest risk for developing severe wound complications following total knee arthroplasty have a history of prior knee skin incisions (Figs. 23.1–23.6).

Unfortunately, many patients in need of primary and revision total knee replacements have had prior operative interventions and may have numerous scars of varying orientations and locations. Performing a new surgical approach in the presence of preexisting incisions can potentially compromise the circulation. For the previously operated knee, it is recommended to place the incision at or near the midline. When possible, preexisting scars should be utilized. In addition, old incisions can be incorporated, if they lie near the midline.

Previous straight medial and lateral incisions, such as those used for collateral ligament repairs, cannot be easily incorporated with a standard midline approach and most often can be ignored. Also, prior short parapatellar incisions can generally be ignored. If necessary, previous incisions can be crossed at 90-degree angles without significant risk of soft tissue complications. Over the creation of a new midline incision. The skin between scars has an increased potential for inadequate vascularity. Also, when there are multiple longitudinal scars about the anterior knee, it is generally recommended to choose the most lateral scar. The rationale for use of the lateral incision is based on the vascular pattern, which is richer on the medial side of the knee compared to the lateral side. In addition, transcutaneous oxygen measurements show reduced oxygen tension in the lateral skin region.

Associated with a high incidence of wound complications are curved medial incisions with large laterally based flap. Typically, the more medial the incision, the larger the lateral skin flap is required for adequate exposure. However, the blood supply of these flaps is random and may be poorly vascularized. In addition, the base to width ratio may not be sufficient to support the flap, resulting in ischemia. Moreover, wide scars with underlying atrophic soft tissue may suggest prior subdermal circulatory compromise and should be approached with caution.

In addition to previous scars, other significant risk factors for the development of soft tissue complications are skin compromised by burns, irradiation, or prior wound healing problems. Irradiated tissue is associated with atrophy, fibrosis, and poor tissue repair secondary to residual endothelial cell injury and endarteritis.