Distal femoral fractures associated with a total knee arthroplasty are mercifully rare, as they are arguably among the most difficult osseous infractions to treat. Fractures occurring outside the “no-man’s land” between the femoral epicondyles and the femoral diaphysis (some 12 cm proximal) are less problematic. Femoral diaphyseal fractures have good bone, less comminution, and sufficient distance from the joint to be minimally affected by the arthroplasty itself. Fractures distal to the femoral epicondyles do not involve the collateral ligaments of the knee, and they can be treated with simple revisional augmentations.

Periprosthetic total knee fractures within 3 to 15 mm of the joint line, however, hold several distinct hazards. First, they can occur with surprisingly little trauma to the limb yet with severe bony comminution. In fact, as a general rule, the less the trauma, the worse the fracture. This is explained by the second point, which is that the supracondylar area of the femur is extremely osteoporotic in these patients, with thin cortices and practically no intramedullary cancellous bone. Once the “eggshell” of the distal femur has cracked, reconstructive efforts will be frustrated by the simple lack of substance proximal to the arthroplasty.

Third, it is rarely appreciated that one of the contributing factors to the fracture is the unsatisfactory nature of the original arthroplasty. This is particularly true of stiff total knees, most commonly the result of a tight posterior cruciate ligament or oversized components. The stress that this stiff arthroplasty places on the femoral bone not only predisposes to fracture, but also confounds attempts at stable fixation. While one would prefer to treat either the fracture or the failed total joint individually, it is often necessary to address these problems simultaneously, since they are so interrelated.

For biologic as well as sociologic reasons, conservative treatment of supracondylar femoral fractures is almost impossible today, and open intervention of some variety is usually necessary.
Many techniques of internal fixation are available, but all share sig-
nificant technical difficulties as well as a surprisingly high inci-
dence of nonunion and malunion. The medial mechanical axis of
the lower limb, the concerted action of the posterior knee muscu-
lature, and the sagittal plane of motion of the joint itself all con-
spire to destabilize even the most rigid internal fixation. This is
compounded by the effects of bony comminution, severe femoral
osteopenia, and a stiff knee arthroplasty. It is not surprising, there-
fore, that many fractures develop nonunions or go on to a tardy
malunion with the typical deformity of adduction, flexion, and
internal rotation of the distal femoral fragment.

Rush rod fixation, as espoused by Ritter\textsuperscript{1} is economical and
expeditious, but in most cases has provided insufficient stabiliza-
tion. Better results have been found with distal condylar plate and
screw devices,\textsuperscript{2} although even good surgical results will often dete-
riorate into nonunion or malunion and the bone available for distal
screw fixation is often compromised by the intercondylar design of
the femoral prosthetic component. New plating systems with abun-
dant supracondylar screw options may improve this situation, but
the biologic issues of bone quality and joint dynamics will remain.

The competing principles of fracture immobilization in the face
of joint mobility require ever more rigid fixation. The use of
intramedullary rods, introduced through the intercondylar notch
of most prostheses, is an attractive option that requires minimal
disturbance of the arthroplasty. Excellent results have been
reported with this technique,\textsuperscript{3} although several important techni-
cal issues should be considered. First, the precise design of the
prosthetic femoral component must be known, so that a rod of
sufficient diameter to achieve intramedullary stabilization of the
fracture can be introduced through the open box of the femoral
component. The diameters of these components are well known
(Table 14.1). There have been apocryphal reports of the need for a
“prosthetic notch plasty” using a Midas Rex burr to enlarge the
metallic intercondylar space, although this is clearly not to be
recommended.

Second, one should be prepared for the necessity to open the
fracture site above the femoral prosthesis and place an intercalary
allograft—sculpted from a distal femur—to surround the
intramedullary rod, fill the metaphyseal void, maintain femoral
limb length, and provide support for the comminuted host cortical
bone, which can be wired about the graft. Without this graft mate-
rial, the rod alone may be insufficient to maintain length and
promote healing of the fracture. Finally, one may enhance the func-
tion of the stiff arthroplasty after stabilization of the fracture by