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Pelvic Support Osteotomy and Limb Reconstruction for Septic Destruction of the Hip [☆]

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Joint instability and limb shortening due to septic destruction of the hip may not be correctable by reduction, fusion, or total joint arthroplasty. In these circumstances, a unique Ilizarov pelvic support osteotomy combined with reconstructive angular correction and lengthening of the limb can ameliorate Trendelenburg gait, restore knee alignment, and correct leg length discrepancy. Surgical reconstruction includes double-level femoral osteotomy resulting in 3 fragments (proximal, middle, and distal). Typically, the proximal osteotomy is a complex valgus-extension-derotation proximal femoral intertrochanteric or subtrochanteric osteotomy with adduction of the proximal fragment and proximal-medial translation of the distal segment to form a new weight-bearing surface between the pelvis and proximal femur (pelvic support). Distal osteotomy at the level of femoral diaphysis or distal metaphysis is used for gradual lengthening and angular correction of the position of the distal fragment to restore limb length and mechanical axis as well as correct associated angular deformity of the knee joint. This article describes the rationale and basic principles of Ilizarov pelvic support osteotomy and limb reconstruction using circular external fixation for septic destruction of the hip with an illustrative case example. *Oper Tech Orthop* 23:158-166 © 2013 Elsevier Inc. All rights reserved.

KEYWORDS Ilizarov, pelvic support reconstruction, septic destruction, hip

Von Bayer,¹ Lorenz,² and Schanz³ are credited with the initial description of proximal femoral valgus osteotomy to improve the function of a destroyed hip. The concept included increasing pelvic-femoral articulation and improving Trendelenburg gait by reducing the adduction arc of the limb. Multiple variations of proximal femoral valgus osteotomy were subsequently described,⁴⁻⁶ modified primarily by the geometric shape of the upper femur and pelvis and perceived improvement in surrogate contact of the upper femur to the pelvis (“pelvic support”). In addition to modest and variable effectiveness of these procedures to improve gait and reduce “hip” pain, the valgus deformity of the limb produced by these osteotomies usually resulted in significant accentuation of limb shortening and, potentially, aggravation of the coronal plane stress through the ipsilateral knee.

Ilizarov⁷⁻⁸ contributed significantly to the enhancement of pelvic support osteotomy by introducing more “efficient” pelvic-femoral articulation with improved support of the upper femur to the pelvis. This was achieved by complex (valgus-extension-derotation) intertrochanteric or subtrochanteric osteotomy with increased adduction of the proximal femoral fragment and proximal-medial translation of the distal fragment to form a new weight-bearing surface between the pelvis and upper femur. Ilizarov pelvic support osteotomy included additional midshaft femoral osteotomy and, if necessary, third osteotomy of the distal femur followed by gradual lengthening and angular reposition of the distal fragment to realign the lower limb (“distal femoral reconstruction”) in an optimum position under the surrogate hip using the Ilizarov external fixator and techniques.⁹⁻¹² In this article, we describe the basic principles of pelvic support osteotomy and limb reconstruction using circular external fixation for septic destruction of the hip using Ilizarov’s methods with an illustrative case example.

Indications and Contraindications

The basic rationale for “pelvic support” is to increase the weight-bearing surfaces between the periacetabular region of the pelvis and the residual upper femur and

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☆Conflicts of interest: All authors report receiving royalties from Orthofix for a circular external fixator (TrueLok) through their employer, Texas Scottish Rite Hospital for Children.

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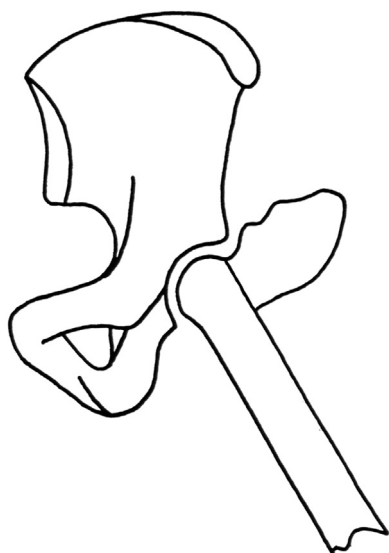


Figure 1 Complex valgus-extension-derotation proximal femoral subtrochanteric osteotomy with adduction of the proximal fragment and proximal-medial translation of the distal segment to form a new weight-bearing surface between the pelvis and proximal femur (pelvic support).

minimize excessive pelvic drop during single-limb stance (Trendelenburg gait) in a clinical situation where the original hip anatomy has been irreparably altered. Such clinical indications include osteoarthritis of the hip (primarily in the era preceding reliable total hip arthroplasty), irreducible hip dislocations of any cause, and septic destruction of the hip. Increased pelvic-femoral articulation is almost always accomplished by a major upper femoral valgus osteotomy (Fig. 1). The distal reconstruction, as introduced by Ilizarov (Fig. 2), consists of a second femoral osteotomy. The second osteotomy (usually in the upper or middle diaphysis of the femur) is performed to counter the valgus deformity-producing effect of the proximal femoral osteotomy. This osteotomy should be designed to orient the limb such that the knee joint is returned to a “normal orientation” relative to new mechanical axis of the limb under the area of pelvic support. Modest lengthening of the limb may be performed at the same level. Often, because of long-standing valgus moments occurring through the ipsilateral knee produced by the Trendelenburg gait with or without hip stiffness, there is secondary (usually valgus) deformity in the distal femur. When present, this deformity may be corrected by a third, distal metaphyseal osteotomy to correct the knee joint orientation to the new mechanical axis of the limb (Fig. 2). Osteotomy in the distal femoral metaphysis may also be used for limb lengthening.

With this concept in mind, the requirements for pelvic support osteotomy and limb reconstruction for septic destruction of the hip become relatively clear (Fig. 3).

- (1) The patient should have adequate preservation of residual “hip” motion to warrant reconstruction (rather than hip fusion).
- (2) The patient is not considered a candidate for total joint arthroplasty, either as a primary, more effective procedure, or likely, in the long term, as the proximal reconstruction

would significantly interfere with attempted total joint arthroplasty, or render it contraindicated.

- (3) The patient should be relatively pain free, as the extent of pain relief from this procedure is unpredictable.
- (4) The patient must be accepting of and cooperative with prolonged treatment courses involving the use of relatively bulky external fixation and with the discomfort of prolonged excessive femoral abduction. This is particularly in the context of the first (proximal valgus) stage of treatment, which typically actually accentuates existing leg length inequality and mandates the need for secondary reconstruction distally.

The contraindications include the following:

- (1) Stiff hip, particularly with significant pain as the primary indication for surgery. Pelvic support

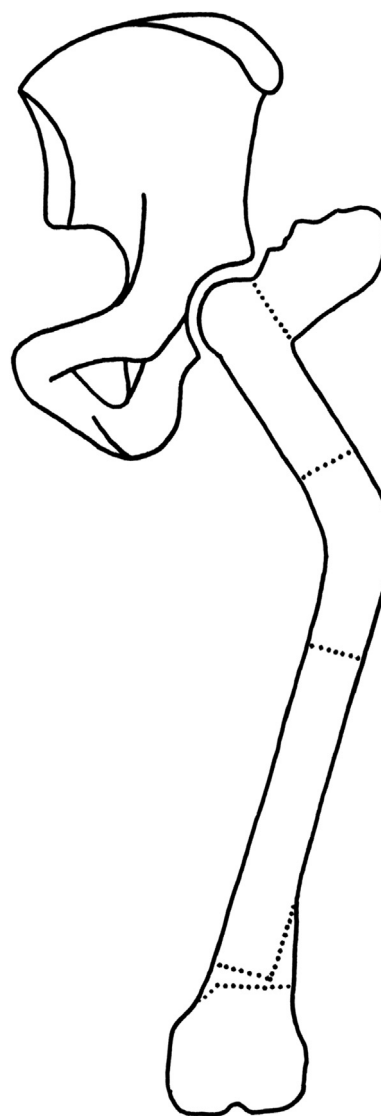


Figure 2 Pelvic support osteotomy and limb reconstruction via midshaft femoral osteotomy followed by gradual lengthening and angular correction for limb realignment finalized by distal metaphyseal osteotomy for correction of associated angular deformity of the knee joint.

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