

# State of the Art: Advancements in Motorized Intramedullary Bone Transport

**B**one transport is a special use of distraction osteogenesis that is used to treat large bone defects. Most commonly, these defects are encountered in the lower limb, specifically the femur and tibia. These defects can be the result of high-energy trauma, tumor resection or infection, and they are often associated with significant soft tissue injury. Traditional approaches to bone transport have historically relied solely on external fixation techniques. Many contemporary modifications such as the use of hexapod fixators, external fixator–assisted transport over nails, and cable-assisted transport have all served to decrease transport times and pin-related complications and improve regenerate maturation and docking site healing. However, major shortcomings continue to be the external device itself, patient compliance, and prolonged time in a frame. These issues have served to facilitate the development of a totally implantable device to accomplish successful transport while respecting the biology of distraction osteogenesis.

Previously plate-assisted bone segment transport (PABST) using the Precice limb lengthening nail has been adapted for use in bone transport with the use of a plate in an effort to eliminate the need for external fixation and its associated complications. However, the arrival of the Precice Bone Transport (PBT) System intramedullary nail eliminates the need for plating. PABST and the PBT nail have become viable alternatives to bone transport using a frame; however, each has its own unique set of advantages and disadvantages. The use of PABST and PBT has been adapted not only for traumatic defects in the tibia and femur but is being used for the treatment of segmental defects as a result of infection and tumor resection as well.

This supplement reviews the history of bone transport and the progression of external fixation techniques up to the use of the internal transport nail. The authors highlight the current use of the PBT nail for defect management of the tibia and femur and contrast PBT nail to the technique of PABST with specific indications for their individual use. Recommendations regarding preoperative evaluation and surgical technique for PBT nail are reviewed, including nail placement, need for and positioning of adjuvant fixation, and corticotomy techniques. As well, guidelines for postoperative management concerning the rate and rhythm of distraction, staged screw exchange, docking site preparation, and nail extraction are also reviewed. Specific techniques for use in post tumor resection defects are also discussed.

This review reflects the current state of these methods based on available evidence and presents very early results. We look forward to the optimization of these protocols by future investigators and await additional results from the use of the Precice Bone Transport System.

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