

Salvaging a Failed Proximal Interphalangeal Joint Implant



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KEYWORDS

• Salvage • Interphalangeal • Implant • Arthroplasty • Arthrodesis

KEY POINTS

- Revision implant arthroplasty at the PIP joint is feasible with both silicone and resurfacing implants.
- Despite reasonable implant survival data, revision PIP implant arthroplasty is associated with a substantial number of complications and reoperations.
- Risk factors for failure of revision PIP implants include postoperative dislocation, the use of pyrocarbon implants, and the need for bone grafting during the revision surgery.
- Ultimate salvage for the failed PIP joint arthroplasty may require arthrodesis or even amputation.

INTRODUCTION: NATURE OF THE PROBLEM

When treating end-stage arthritic degeneration of the proximal interphalangeal joint (PIP), surgeons can now choose between silicone spacers and surface replacement arthroplasties (pyrocarbon and metallic). Although largely successful in maintaining range of motion and alleviating pain, the outcomes after implant arthroplasty at the PIP joint are imperfect. Reoperations are common, with the incidence of reoperation ranging from 6% to 58%.^{1–6} Although less frequently performed, revisions for failed primary implants are also frequent, with an incidence estimated between 8% and 26%.^{3,7,8}

At the time of implant salvage, surgeons face a choice of revision arthroplasty, arthrodesis, or amputation. This article details the use of each of these options and discusses the outcomes following these procedures.

INDICATIONS/CONTRAINDICATIONS

Revision Implant Arthroplasty

Revision after implant arthroplasty of the PIP joint is most commonly indicated for pain, restricted

motion, and coronal plane deviation (**Boxes 1 and 2**).⁹ Although most silicone arthroplasties will eventually fracture by 10 to 15 years,^{10,11} the average time between primary implant and revision primary for pain or restricted active motion was only 4 years in a series of 27 patients.⁹ Notably, silicone implant breakage is not always symptomatic.

Secondary Arthrodesis

Arthrodesis is an alternative salvage for the failed PIP arthroplasty. A failed PIP implant arthroplasty of the index finger is a relative indication for arthrodesis as the primary revision option.⁹ A second relative indication favoring arthrodesis over revision implant arthroplasty is ulnar deviation through the failed PIP joint implant, because this deformity is not reliably corrected with revision implant⁹ (**Box 3**).

Amputation is a second salvage that we find most useful when the patient expresses the desire to move on in life without the symptomatic finger and asks that it be removed. There are no absolute

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Box 1**Indications for revision implant arthroplasty**

Recurrent dislocation after PIP implant arthroplasty

Hyperextension or contracture of PIP after implant arthroplasty

Malaligned implant arthroplasty

Symptomatic fractured silicone implant

Symptomatic loose resurfacing implant

contraindications to amputation, as it can be used to treat recalcitrant infection and the level of amputation can be chosen to ensure adequate soft tissue closure (**Box 4**). As the technical aspects of digit amputations are similar for failed arthroplasty and other diagnoses, the details of performing amputations are not included in the techniques to follow.

SURGICAL TECHNIQUE/PROCEDURE***Preoperative Planning***

When planning a revision surgery for any PIP arthroplasty, equal consideration is required for both the technical planning and setting appropriate patient expectations. A detailed preoperative conversation with the patient should discuss the ultimate goals for the digit and expectations for the surgery. The surgeon should openly discuss the risks of surgery, acknowledging that these patients have already failed one attempt at arthroplasty. At times, surgical consent may need to include multiple possibilities, such as revision implant arthroplasty versus arthrodesis, depending on intraoperative evaluation of the bone and soft tissues.

Technical planning requires consideration of the soft tissue envelope around the PIP joint, the status of the extensor apparatus, the location of prior incisions, and the remaining bone stock to support the revision arthroplasty. As part of the preoperative assessment, the surgeon should carefully examine for any clinical evidence of infection complicating the failed PIP arthroplasty.

Box 2**Contraindications for revision implant arthroplasty**

Active infection

Inadequate soft tissue coverage for joint

Incompetent or nonrepairable collateral ligaments (for resurfacing implants)

Lack of flexor tendon function

Box 3**Indications for secondary arthrodesis**

Recurrent dislocation after PIP implant arthroplasty

Hyperextension or contracture of PIP after implant arthroplasty

Symptomatic fractured silicone implant

Symptomatic loose resurfacing implant

Failed arthroplasty of index PIP joint

Preparation and Patient Positioning

Revision surgery for a failed PIP implant arthroplasty is expected to be outpatient surgery with preparation and patient positioning similar to most elective hand surgeries. Either a high arm or forearm tourniquet is used at the surgeon's discretion. A regional nerve block anesthesia may be sufficient for patient comfort. This may be supplemented with sedation as needed. Typically, the patient remains supine on an operative stretcher with the shoulder abducted and hand resting on an arm table. A mini C-arm should be available.

Surgical Approach

The surgical approach for salvage of the failed PIP implant arthroplasty is often dictated by the prior incision and quality of the soft tissue envelope. Similar to Satteson and colleagues,¹² we prefer to use the existing incision from the primary surgery. Most commonly, this results in a dorsal approach and requires dissection through the extensor tendon, which introduces the risk of extensor tendon dysfunction, including adhesion formation, incompetence, and imbalance.^{3,4,13-16} When the extensor apparatus is insufficient or damaged, the dorsal approach provides access for reconstruction of the extensor apparatus during the surgery.¹⁷

Although less commonly performed, the volar approach to the PIP joint offers the advantages of allowing any necessary flexor tenolysis and immediate postoperative motion, as the extensor apparatus is not violated.^{18,19} However, this approach risks flexor tendon bowstringing, swan-neck deformity, heterotopic ossification, and an increased risk of implant failure.^{4,13,20} For

Box 4**Contraindications for secondary arthrodesis**

Active infection

Inadequate soft tissue coverage for joint

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