

# Clinical Outcomes and Therapy Strategies for Surface Replacement PIPJ Arthroplasties after a Volar or Lateral Approach

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## Objectives

- Little has been published to date reporting outcomes of the volar and lateral approaches, nor detailing, standardized post-operative therapy regimen that are necessarily different from those used after more commonly used dorsal approaches
- Retrospectively review motion, function, and pain relief following cemented semi-constrained, surface replacement arthroplasties of the proximal interphalangeal joint (SC-SR PIPJ) in 32 fingers from January 21, 2000 to December 5, 2011.
- Review the post-operative therapy protocols, and to assess outcome differences between lateral and volar approach groups.
- Report on observed clinical complications in patients undergoing SC-SR PIPJ using volar and lateral surgical approaches.

## Methods

- We retrospectively reviewed 32 SC-SR PIPJ (4 men and 28 women) performed over 12 years by a single surgeon, Kevin Renfree, M.D.
- Average age was 66.5 (range: 39-85 years).
- 8 had rheumatoid arthritis, and 24 had osteoarthritis.
- 5 (15%) joints underwent a lateral approach.
- 27 (84%) joints underwent a volar approach.
- A lateral approach was performed only in border digits (3 index and 2 small) in order to preserve the outside collateral ligament integrity.
- Affected digits include 3 index, 16 long, 9 ring, and 4 small.
- The primary reason for surgery in all cases was pain.
- Patients were mailed a questionnaire to determine current level of pain and function (quickDASH).
  - 13 questionnaires were returned.

## General Therapy Protocol

- **Immediately post-operative**
  - Placed in bulky dressing with volar forearm-based plaster splint to fingertips
  - Wrist, MPJs, and IPJs at 0° extension
- **2 days post-operative**
  - Digit placed in dorsal extension blocking orthosis at 10-30° (Figure 1); include adjacent radial digit, or ulnar digit if index finger
  - Full flexion encouraged from splint (Figure 2A-B)
  - Begin distal interphalangeal joint (DIPJ) flexion if available; some arthrodesed
  - Blocking, hook fist, composite fist, and straight fist encouraged for oblique retinacular ligament stretch, tendon gliding, and joint mobility
  - Repeat ROM exercises 5-10 repetitions 8-10 times per day
  - While exercising out of the splint while being observed by the therapist or after patient exhibits understanding of self-protected PIPJ AROM (Figure 3) they are buddy splinted to the adjacent radial digit
  - A light dry dressing which is changed daily, but is discontinued once sutures are removed
  - Orthosis is worn at all times except to air-dry the digit, change dressings, or while patient performs self-protected AROM
  - Elevation, making fist above head or swimming motion in air for edema
  - Refrain from using the involved digit for activities of daily living (ADL) in the early phase – the first 2 weeks
  - Typically seen 2-3 times per week during the first 2 weeks for wound and position check, and encouragement in home exercise program
- **2 weeks post-operative**
  - Sutures are removed if healing adequately and the orthosis is adjusted for improved fit
  - All exercise should continue to be performed in the orthosis or with the buddy splint in a self-protected fashion
  - Continue to use the custom orthosis day and night
  - When there is no scab remaining, scar management is begun which includes instruction in friction massage as well as night use of silicone gel sheeting (Figure 4)
- **6 weeks post-operative**
  - May discontinue the use of the day orthosis, but continue to buddy splint to adjacent radial digit (except index finger; use adjacent ulnar digit) and use night orthosis for 12 weeks (Figure 2C-D)
  - Orthosis is adjusted to be at full extension/0°
  - May begin to use for moderate ADL such as meal preparation, laundry, writing, and light housework
- **12 weeks post-operative**
  - May gradually return to heavier activities such as golf, tennis, rowing, and heavier daily tasks
  - Therapist will help to arrange an appropriate graded timeline for return based on joint stability, strength, and current activity level
  - A specific strengthening program is typically not employed
  - All orthosis use is discontinued
  - If there is any lack of lateral stability, a buddy system may continue to be needed for some activities such as golf and gardening

## Results

- 13/32 (40%) patients returned the quickDASH follow-up questionnaires and tracings of their involved digit in maximum extension and flexion
- For the 13 patients who returned the quickDASH:
  - Average follow-up time: 51 months (range: 10 months to 7.75 years)
  - Average follow-up overall: 31 months (range: 1 month to 10 years)
  - Average pre-operative extension/flexion (measured by goniometer): -8.64/68.18°
  - Average post-operative extension/flexion (measured by goniometer): -15.75/81.33°
  - Average pain level: 15/5
- For all 32 patients:
  - Average pre-operative extension/flexion: -9.27/68.14° (range: -10/100°)
  - Average post-operative extension/flexion: -16.42/70.45° (range: -10/96°)
- Average score for the 11 questions on the quickDASH: 2.11
- Complications noted in the chart or returned packets in all 32 patients:
  - 2 ulnar deviation deformities of 20°
    - » 1 of these patients did not receive therapy at our facility
  - 1 rigid flexion contracture (50°) after a lateral approach
  - 2 infections
  - 6 swan neck deformities (all volar)
    - » 1 was >20° and required volar plate advancement
    - » 5 were mild (0-10°) and were correctable with a figure of 8 style orthosis
  - 3 were after redo for failed silastic implants
  - 1 scar hypersensitivity (volar)
- The average number of therapy visits was 14.33 days with no difference between volar and lateral approaches
- 4 patients had DIP fusions of same digit:
  - 1 was in the small finger and the post-operative ROM at the PIP was -50/90°
  - 3 were -20/90°, 0-60° and 0-70° respectively and did not vary from average results



Figure 1: (A) Initially the finger orthosis is set -10° to -30° to protect the volar plate.

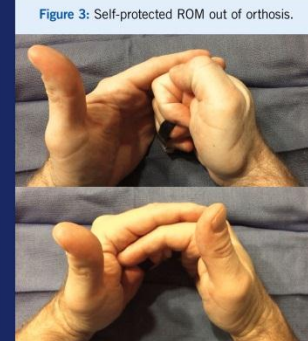


Figure 3: Self-protected ROM out of orthosis.

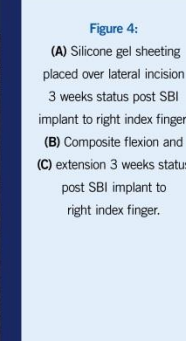


Figure 4: (A) Silicone gel sheeting placed over lateral incision 3 weeks status post SBI implant to right index finger. (B) Composite flexion and (C) extension 3 weeks status post SBI implant to right index finger.

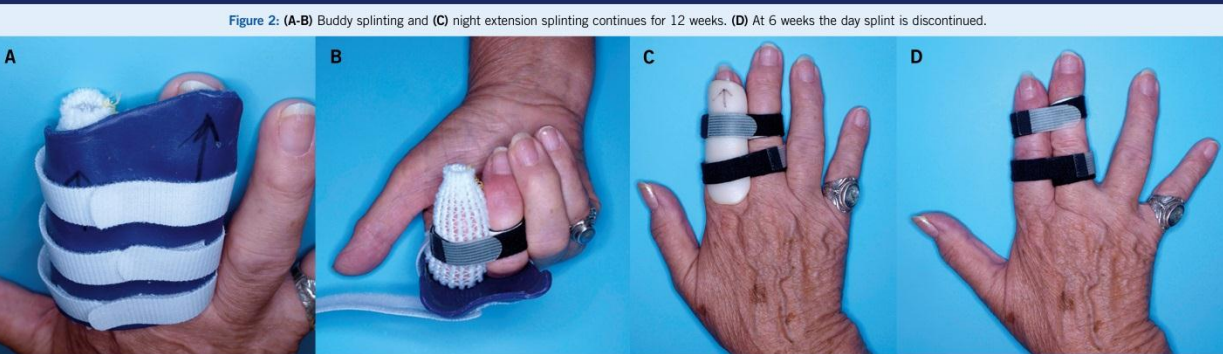


Figure 2: (A-B) Buddy splinting and (C) night extension splinting continues for 12 weeks. (D) At 6 weeks the day splint is discontinued.

Table 1: Data from Patients Who Returned Questionnaires

Gender	Age	DOS	Affected Side	Digits	Pre-Operative Extension	Pre-Operative Flexion	Post-Operative Extension	Post-Operative Flexion	Follow-Up, Months	Complications	Disease	Volar	Score
F	58	1/28/05	Left	Long	0	60	10	50	92	Mild swan neck	OA	Volar	34.09
F	77	3/8/06	Right	Ring	5	70	0	85	78	None	OA	Volar	6.81
F	68	4/27/06	Left	Ring	0	90	40	90	77	None	OA	Ulnar midsagittal	58.33
F	56	5/25/06	Right	Long	10	50	-	-	76	No postoperative follow-up notes	OA	Ulnar midsagittal	4.54
F	72	8/10/06	Right	Long	20	85	15	90	73	None	OA	Volar	0
M	65	2/15/08	Right	Long	20	60	44	96	55	None	OA	Volar	2.27
F	54	12/2/08	Right	Long	0	60	15	90	45	None	OA	Volar	11.36
F	71	8/25/09	Right	Index	0	50	0	75	37	None	OA	Volar	7.50
F	61	12/30/09	Right	Long	Actively fixed	Actively fixed	0	55	33	Swan neck deformity, return to OR for excision of painful osteophyte and radial digital nerve neurolysis for painful neuroma	OA	Volar	27.27
F	74	3/5/10	Left	Long	-	-	20	70	30	None	OA	Volar	59.09
F	72	3/25/10	Right	Index	0	90	0	95	30	None	OA	Volar	65.90
F	76	11/9/10	Left	Ring	20	85	15	90	22	None	OA	Volar	65.90
F	60	12/5/11	Left	Small	20	50	50	90	9	Sensitive scar, insensate distal to incision	OA	Radial midsagittal	47.72

## Conclusions

- The observed clinical complication rate for all 32 patients was 28%, similar to reports in the literature.<sup>1</sup>
  - Not completely comparable because we did not include radiographic information for this study.
- If patient develops extension contracture, can often be addressed with manipulation under digital block anesthesia in first 6 weeks.
- Attention should be placed on signs of formation of flexion contracture, ulnar deviation, and hyperextension of PIP.
  - Post-operative therapy and orthoses should be adjusted accordingly.
- No dynamic orthoses were used in the post-operative management.
- It may be helpful to increase flexion of the PIP orthosis if the implant is a re do (prior silastic), there is an infection and if the finger begins to hyperextend at all during the first few weeks of therapy.

## References

1. Adams J, Ryall C, Pandyan A, et al. Proximal interphalangeal joint replacement in patients with arthritis of the hand: a meta-analysis. The Journal of bone and joint surgery British volume. 2012;94(10):1305-12.