

Functional Outcomes of Percutaneous A1 Pulley Release in Adult Trigger Finger: A Prospective Observational Study

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ABSTRACT

Trigger finger is a common cause of hand pain and functional limitation in adults. Although conservative management remains the first-line treatment, surgical intervention is required in refractory cases. This short communication reports the short-term functional outcomes and safety profile of percutaneous A1 pulley release performed in an outpatient setting. Sixty-two adult patients underwent percutaneous release and were followed for three months. Significant improvements were observed in pain scores, range of motion, and disability indices. The procedure demonstrated a high success rate (85.5%) with minimal complications and low recurrence. Percutaneous A1 pulley release appears to be a safe, effective, and cost-efficient technique for managing trigger finger.

Keywords: Trigger finger, Percutaneous A1 pulley release, Stenosing tenosynovitis, Functional outcome, Hand surgery.

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Introduction

Trigger finger (stenosing tenosynovitis) results from entrapment of the flexor tendon at the A1 pulley due to thickening and inflammation. Patients typically present with pain, locking, stiffness, and reduced active motion of the affected digit. The condition most commonly affects middle-aged individuals and is more prevalent among women and patients with diabetes.

While corticosteroid injections and splinting are effective in early stages, persistent or recurrent symptoms often require surgical release. Percutaneous A1 pulley release has gained attention as a minimally invasive alternative to open surgery, offering reduced tissue trauma, faster recovery, and lower procedural cost. This study evaluates the short-term clinical and functional outcomes following percutaneous A1 pulley release.

Materials and Methods

A prospective observational study was conducted over 18 months in a tertiary care orthopaedic department. Adult patients (≥ 18 years) diagnosed clinically with trigger finger refractory to conservative treatment were included. Patients with trigger thumb, previous surgery on the affected digit, active infection, or involvement of pulleys other than A1 were excluded. All procedures were performed under local anesthesia

using a percutaneous needle technique. After sterile preparation, the A1 pulley was identified anatomically, and release was performed using a controlled sweeping motion of an 18–20 gauge needle until triggering resolved.

Patients were followed up on postoperative day 3, day 7, day 15, one month, and three months. Outcomes were assessed using:

Visual Analog Scale (VAS) for pain

Active range of motion (goniometric measurement)

Disabilities of the Arm, Shoulder and Hand (DASH) score

Descriptive and inferential statistical analyses were performed, with $p < 0.05$ considered statistically significant.

Results

A total of 62 patients were included, with a mean age of 42 years. Females constituted 61.3% of the study population. The ring finger was most commonly affected (35.5%), followed by the middle finger.

Pain Reduction

Mean preoperative VAS score was 6.8 ± 1.2 . Postoperative improvement was significant at all follow-up intervals:

Day 3: 3.4 ± 1.0

Day 7: 2.1 ± 0.9

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1 month: 0.8 ± 0.5

3 months: 0.3 ± 0.5

The reduction in pain was statistically significant ($p < 0.001$).

Range of Motion

Mean preoperative active arc of motion was 95.6° . This improved progressively:

1 month: 110.3°

3 months: 113.6°

Improvement was statistically significant ($p < 0.001$).

Functional Improvement

Mean preoperative DASH score was 42.5 ± 8.6 . This improved to:

1 month: 18.2 ± 6.3

3 months: 8.5 ± 4.1

Functional recovery was significant ($p < 0.001$).

Overall Outcomes

At three months:

Complete symptom relief: 85.5%

Partial relief: 9.7%

No improvement: 4.8%

Complications

Complications were minimal:

Superficial bleeding: 3.2%

Surgical site infection: 1.6%

Recurrence: 4.8%

Reoperation required: 3.2%

No cases of tendon rupture or neurovascular injury were observed.

Diabetic Subgroup

Diabetic patients demonstrated slightly lower complete relief rates (66.7%) compared to non-diabetics (90%), with higher recurrence rates. However, overall improvement remained clinically meaningful.

Discussion

This study demonstrates that percutaneous A1 pulley release provides rapid pain relief, significant functional improvement, and high patient satisfaction within a short follow-up period. The minimally invasive nature of the technique allows early mobilization and faster return to daily activities.

The overall success rate of 85.5% aligns with previously reported outcomes in literature, where success rates range between 85–97%. Complication rates were low, and no major adverse events were encountered. The absence of tendon or nerve injury suggests that careful anatomical technique minimizes risk.

Although diabetic patients exhibited slightly inferior outcomes, the procedure remained effective in this subgroup. Recurrence rates were low and comparable to those reported in open surgical series.

Compared to open surgery, percutaneous release offers advantages such as smaller incision, reduced postoperative pain, shorter procedure time, and lower cost. However, incomplete release remains a potential

limitation, particularly in cases with long-standing disease or severe pulley thickening.

Conclusion

Percutaneous A1 pulley release is a safe, effective, and economical treatment for adult trigger finger. It provides significant pain reduction, improved range of motion, and marked functional recovery with minimal complications. The procedure can be performed in an outpatient setting with high success rates. Careful patient selection and surgical expertise are essential to optimize outcomes.