educate community providers to either perform an acceptable bony reduction or refer patients to treating facilities capable of performing these techniques in the early postinjury period.

REFERENCES:
1. Chung C, Spilson SV. The frequency and epidemiology of hand and forearm fractures in the United States. J Hand Surg Am. 2001;26:908–915.
2. Chung KC, Malay S, Shauver MJ, et al, for the WRIST Group. Assessment of distal radius fracture complications among adults 60 years or older: a secondary analysis of the WRIST Randomized Clinical Trial. JAMA Netw Open. 2019;2:e187053.

Utility of Routine Pathologic Specimens in Ganglion Wrist Excisions

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INTRODUCTION: As healthcare costs continue to rise, increased emphasis has been placed on cost-benefit optimization. One area of investigation has been the utility of pathologic examination of specimens from routine procedures with low preoperative suspicion for malignant pathology. Previous literature has challenged the established pathology guidelines in other surgical subspecialties, but no studies have been conducted on the value of routine pathology within hand surgery. The goal of this study was to assess the utility and cost of routine pathologic analysis for one of the most commonly performed procedures in hand surgery, ganglion cyst excision.

METHODS: A retrospective cohort study was performed following institutional review board approval. Billing records were searched for CPT code 25111-25112 (Ganglion Cyst Excision) over a 5-year period. All identified records were then searched for associated pathology billing codes, preoperative diagnoses, and postprocedural diagnoses. Pathology reports were then reviewed for final surgical diagnoses. Lastly, associated pathology charges were obtained from our institutions billing department.

RESULTS: A total of 407 patients underwent ganglion cyst excision at our institution between 2015 and 2019 by 7 different fellowship-trained hand surgeons. Of those patients, 318 (78.1%) had specimens sent for pathologic review. Thirty-two of those patients (10.1%) had nonganglion cyst diagnoses preoperatively. All 32 charts were reviewed and 31 of the 32 patients had high suspicion for “ganglion cyst” preoperatively with confirmation of diagnosis after intraoperative findings. One patient had abnormal pathology (0.3% of specimens), which was diagnosed preoperatively as a “cystic vascular malformation” on preoperative imaging. All reviewed specimens were associated with a “Level 3 Surgical Pathology” and “Tissue Exam Level 3” billing code, which corresponded to a billing charge of $258.

CONCLUSION: Current national guidelines for pathologic review of intraoperative specimens are the result of recommendations proposed in 1996 by the College of American Pathologists and do not take into consideration the surgeon’s clinical acumen. Of the 407 patients who underwent excision of a ganglion cyst, 78 percent had specimens sent for pathology, with only 1 nonganglion diagnosis (0.3%) following pathology evaluation. The 1 nonganglion diagnosis identified was suspected to be “nonganglion” pathology on preoperative evaluation. Over the past 5 years, $81,786 was spent at our institution to confirm a benign pathologic finding that was correctly diagnosed by the physician preoperatively/intraoperatively. These findings would suggest that routine pathology specimens are not indicated in cases where surgeons have a high clinical suspicion for ganglion cyst, and pathologic review should be reserved for cases with atypical findings.

Pulley Release and Reconstruction With Acellular Dermal Matrix After Zone 2 Flexor Tendon Injury

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PURPOSE: Flexor tendon injuries in zone 2, commonly referred to as “no man’s land”, have high incidence of postoperative stiffness. Historically, it was thought that release or venting of the A2 or A4 pulley would lead to bowstringing and weakness. Building upon the success of acellular dermal matrix (ADM) to maintain strength and avoid
adhesions in hostile abdominal hernia repair environments, our group has developed a novel technique for zone 2 flexor tendon repair that includes pulley release and reconstruction using ADM. Here we report our technique and experience with zone 2 flexor tendon repair with pulley release and ADM reconstruction.

**METHODS:** A retrospective review was performed to identify all patients at a University Level 1 Trauma Center who underwent zone 2 flexor tendon repair with pulley release and ADM reconstruction. Outcomes were reviewed and descriptive statistics performed. Our technique begins, when possible, with wide awake surgery with local anesthesia and no tourniquet. Brunner incisions are made, and the proximal and distal cut tendon ends are identified and retrieved. The entire pulley overlying the tendon repair is released by longitudinal midline incision. FDP is repaired with core and epitendinous sutures, and both FDS are repaired for an anatomic reconstruction. The patient then actively ranges the finger and additional liberal pulley release is performed if necessary. Next, pulley reconstruction is performed with 2 × 4 cm ADM, custom-cut and secured to the cut ends of the pulley with tension sufficient to hold the tendons in anatomic position. The finger is again actively ranged to confirm gliding under the ADM. The skin is closed and a splint applied. Early active motion therapy follows, when appropriate.

**RESULTS:** Twelve patients who underwent zone 2 flexor tendon repair with ADM pulley reconstruction were identified over an 18-month period. Six patients were excluded due to follow-up shorter than 2 months, leaving 6 patients with 10 fingers treated for inclusion. Mean age was 39 years and mean follow-up 3.0 months. All 10 fingers suffered lacerations to FDP and FDS in zone 2. FDP and FDS were repaired in 80% of fingers, with 20% forgoing FDS repair due to multilevel laceration. Sixty-six percent of patients were noncompliant with hand therapy. No patients demonstrated evidence of bowstringing at last follow-up. Minimal or no stiffness was observed in 60% of patients, including 1 patient who was noncompliant with therapy. Significant stiffness was observed in 40% of fingers, all in patients noncompliant with therapy.

**CONCLUSION:** Successful management of zone 2 flexor tendon injuries can be accomplished with pulley release and reconstruction using ADM, with no concern for bowstringing. Therapy compliance remains important to minimizing stiffness. Further comparative studies will be required to evaluate cost-effectiveness and identify specific patients who will benefit most from this technique.

**Comparing Open Carpal Tunnel or Trigger Finger Release Procedures Performed Under Local Anesthesia With or Without the Use of a Tourniquet**

**Presenter: Joseph Saleh, Medical Student**

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**BACKGROUND:** Carpal tunnel syndrome and trigger finger are 2 of the most common conditions treated by the hand surgeon. During these procedures, a tourniquet is often used to minimize bleeding and improve visualization of the operative field. However, it may be associated with pain and discomfort. To date, there are few prospective studies investigating the safety and patient-centered outcomes of tourniquet-free minor hand procedures.

**METHODS:** This is a randomized controlled trial comparing patients undergoing open carpal tunnel or trigger finger release with or without the use of a tourniquet. Perioperative subjective patient experience was investigated for both techniques. This was measured based on a Numerical Rating Scale for pain, anxiety, and overall satisfaction. In addition, this was an equivalence trial in terms of operative time, bleeding scores, and perioperative complication rates.

**RESULTS:** A total of 67 patients were recruited. Both groups were similar with respect to distribution of age, sex, handedness, antiplatelet use, and tobacco use. Median scores for operative time, anxiety, and overall satisfaction were comparable between the 2 groups. With regard to patient discomfort, median scores were significantly higher in the tourniquet group when compared to the no tourniquet group (3.0 versus 1.0; \( P = 0.02 \)). Bleeding scores for the tourniquet group were significantly lower than for the no tourniquet group (\( P = 0.001 \)).

**CONCLUSION:** The application of WALANT in minor hand surgery procedures has been shown to decrease tourniquet-associated discomfort, improving perioperative patient experience. Additionally, it demonstrated the noninferiority of the tourniquet-free technique with respect to operative time and the rate of perioperative complications.