

Cost Minimization Analysis of Ganglion Cyst Excision

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Purpose Cost minimization analysis can be employed to determine the least costly option when multiple treatments lead to equivalent outcomes. We present a cost minimization analysis from the payers' perspective, of the direct per patient cost of arthroscopic versus open ganglion cyst excision. We tested the null hypothesis that there is no difference in cost between the 2 procedures from the payer perspective.

Methods We utilized data from a private payer administrative claims database comprising 16 million individuals from 2007 to 2015. Using Current Procedural Terminology codes to identify open and arthroscopic ganglion excisions, we extracted demographic data and fees paid to providers and facilities for the procedure.

Results We identified 5,119 patients undergoing open ganglion cyst excision and 20 patients undergoing arthroscopic ganglion excision. The average cost of an open excision was significantly lower than an arthroscopic excision (\$1,821 vs \$3,668).

Conclusions Surgical costs from arthroscopic ganglion excision are significantly more than open excision. This data can inform health systems participating in value-based models. (*J Hand Surg Am.* 2017;■(■):1.e1-e4. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Economic and Decision Analysis IV.

Key words Wrist arthroscopy, quality, cost, ganglion cyst, value.



GANGLIONS CYSTS ARE THE MOST common soft tissue mass of the wrist and hand.¹ Patients present for cosmetic concerns, concern of malignancy, and pain.² Whereas ganglion cysts may spontaneously resolve,³ symptomatic cysts may require intervention. Treatment options

include aspiration, arthroscopic excision, and open excision. Aspiration has variable effectiveness and higher recurrence rates than surgical excision.^{3–6} Traditionally, open excision was considered the gold standard for treatment^{1,5–10} and was the only surgical option until Osterman and Raphael¹¹ described arthroscopic excision in 1995. Subsequent case series report similar recurrence rates in arthroscopic and open ganglion cyst excisions.^{12–17} These findings are further supported by the findings of Kang et al¹⁸ who reported a randomized, controlled trial between arthroscopic and open excision. They did not find superiority of either procedure in regards to recurrence, postoperative pain, or postoperative complications.¹⁸ To date, no evidence suggests arthroscopic wrist ganglion excision leads to superior results compared with those of open excision.

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Health care is shifting toward value-based payments. Specifically payers, such as Medicare, are beginning to reimburse physicians and health systems based on “value,” the cost incurred to achieve a high-quality outcome. Such payment models include the Physician Quality Reporting System¹⁹ and Value-Based Payment Modifier Program.²⁰ For example, in certain metropolitan areas, Medicare is reimbursing health systems with a “bundled” payment for total joint arthroplasty to reimburse for surgery and postoperative care. Judicious use of resources, minimizing complications and readmissions, and patient activation (engaging patients to have the knowledge, skills, and confidence to manage their own health) are all approaches for health systems to improve value and share in cost savings.²¹ In value-based models, procedures that minimize cost while achieving an equivalent clinical outcome are favored because they provide a higher value of care (same quality with less cost). Cost minimization analysis is an economic framework that examines the cost of treatments in order to determine the least costly option. This analysis is applied to treatments with equivalent outcomes.²² Because the current literature does not support the superiority of arthroscopic over open ganglion excision,¹⁸ we completed a cost minimization analysis and tested the null hypothesis that there is no difference in the cost per procedure for arthroscopic compared with open wrist ganglion excision.

METHODS AND MATERIALS

Data

A national, private payer database (Humana) was used for this study because it reports facility and physician fees for each procedure. This database is composed of 16 million patients and covers diagnoses, procedures, prescription, and laboratory claims from years 2007 to 2015. Data were obtained using the PearlDiver Patient Records Database (PearlDiver Technologies, Fort Wayne, IN). All data are deidentified and anonymous and were thus exempt from institutional review board approval. The billing sources include facility and physician fees. The search results yielded the number of patients with the searched code or combination of codes in each year, 5-year age group, and region of the United States.

Cost

Cost was defined as reimbursement fees from the payer perspective. Cost was reported as total cost and also subdivided by facility and physician cost. We searched the database using Current Procedural

TABLE 1. Search Codes

Procedure	CPT
Arthroscopy, wrist, diagnostic; with or without synovial biopsy	29840
Arthroscopy, wrist, surgical; synovectomy, partial	29844
Arthroscopy, wrist, surgical; synovectomy, complete	29845
Excision of ganglion, wrist	25111

Terminology (CPT) codes to identify arthroscopic and open ganglion excisions. Search protocols were designed to include patients with a primary diagnosis of “ganglion cyst” (International Classification of Diseases, Ninth Revision, 727.4) having undergone primary open ganglion excisions (CPT 25111) and primary arthroscopic ganglion excisions (CPT 25111 and CPT 29840 or 29844 or 29845) (Table 1). We then stratified our search to exclude patients concurrently undergoing other common upper extremity outpatient procedures listed in Table 2 to ensure costs from arthroscopic surgery were limited to addressing only the ganglion cyst. Standard deviations were calculated from the data extracted and a nonparametric *t* test, assuming unequal variances, was used to examine group differences with significance level (α) set at 0.05.

RESULTS

We identified 5,119 patients undergoing open ganglion cyst excision and 20 patients undergoing arthroscopic excision. Demographic information for the 2 groups is presented in Table 3. The average total cost (facility + physician fees) of an open excision was significantly lower than that for an arthroscopic excision ($\$1,821 \pm \$1,127$ vs $\$3,668 \pm \872 ; $P < .05$) (Fig. 1). Cost for arthroscopic excisions was the combined cost for arthroscopic wrist procedure and cost for the ganglion excision.

DISCUSSION

Arthroscopic wrist ganglion excision is an alternative technique to open excision with many potential benefits, including evaluation for intra-articular pathology. Direct comparison between open and arthroscopic excision, however, has not demonstrated a difference in outcomes in regards to pain, recurrence, or rate of complication with respect to the ganglion itself.¹⁸ Economic analysis comparing these 2 becomes relevant in value-based reimbursement

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