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Original Article

Functional recovery following surgery for chronic subdural hematoma

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ABSTRACT

Background: Among the elderly, chronic subdural hematoma is a relatively common neurosurgical condition. Presenting symptoms range from headache and focal neurological deficits to seizure and coma depending on location and extent of brain compression. Functional recovery following surgery for chronic subdural hematoma is central to quality of life and ongoing health for elderly patients; however, there is a paucity of data regarding functional recovery in this population.

Methods: In this study, the physical activity of patients who underwent surgical evacuation of chronic subdural hematoma was surveyed, as well as participation in physical therapy following surgery. In total, 38 patients completed the survey.

Results: Of the 30 patients who exercised regularly before surgery, 28 (90.3%) returned to exercise within 1 year after surgery. Of 13 patients who reported playing hobby sports before surgery, 9 (69.2%) returned to those sports. 17/38 (44.7%) patients participated in physical therapy after surgery. 35/38 (92.1%) of patients reported that the surgery improved their quality of life.

Conclusion: The majority of patients who underwent surgery for chronic subdural hematoma were able to return to exercise within 1 year. Participation in physical therapy was associated with return to exercise and sports. Further study is needed to determine which factors contribute to a return to baseline levels of physical activity following surgery for chronic subdural hematoma.

Keywords: Chronic, Exercise, Neurosurgery, Neurovascular, Physical therapy, Subdural hematoma

INTRODUCTION

Chronic subdural hematoma (cSDH) is a common disease process encountered in neurosurgery. Reported incidence of cSDH is between 1.72 and 20.6/100,000 persons per year across the study populations, with an increased incidence in patients over 60 years of age.[1,2] The underlying pathophysiology varies from damage to subdural bridging veins to inflammatory processes and osmotic oncotic pressure gradients, culminating in accumulation to periparenchymal fluid.[3] In addition, there have been case reports of cSDH developing due to dural metastases.[4,5] Clinical presentation is variable and influenced by location and extent of brain compression. Common symptoms include headache, mental status changes, gait changes and other motor difficulties, and focal sensory disturbance.[6,7] A meta-analysis of 1252 patients who underwent surgery

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for cSDH compared presentation and outcome in younger patients (18–49 years old, n = 52) with patients aged 50 years and older (n = 1200).[6] This study found that patients younger than 50 typically presented with signs of increased intracranial pressure, whereas older patients were more likely to present with neurological deficits.[6] Acute progression can also manifest as seizures, nausea, and vomiting. Risk factors aside from older age include male gender, chronic alcoholism, coagulopathies, and use of anticoagulant medications.[1,3,8,9]

Surgical evacuation of cSDH is generally performed through craniotomy or burr holes, with or without external drain placement. Following surgical evacuation, clinical status improvement rates are high, although oftentimes patients do not return to baseline before discharge.[8,10] Notably, trunk control and balance are frequently impaired in the early recovery period, which can affect quality of life and return to prior activity levels. Although recovery from acute neurological symptoms and recurrence rates of cSDH have been studied fairly extensively, little has been published regarding long-term functional recovery or return to prior lifestyle activities following surgery for cSDH. In this study, we sought to examine rates of long-term symptom improvement and return to exercise and hobby sports in patients who underwent surgery for evacuation of cSDH.

MATERIALS AND METHODS

We identified all patients treated surgically for cSDH at our institution between January 1, 2014, and December 31, 2018, through CPT codes. Eligible participants received a phone call to participate in a five-question survey regarding their recovery following surgery for cSDH. The survey included questions regarding symptom improvement after surgery, participation in exercise or hobby sports before surgery, and return to exercise or hobby sports following surgery. We also inquired if the patients participated in physical therapy after surgery, and if they found that participation helpful [Figure 1]. Demographic and clinical data were also collected through our patient database. Descriptive statistical measures were used to analyze the collected survey data in addition to a two sample t-test comparing groups that did or did not participate in physical therapy following surgery.

RESULTS

Inclusion criteria included adults aged 18–89 that had surgical treatment for chronic subdural hematoma from January 1, 2014, to December 31, 2019. Patients were identified in a neurosurgery quality database. Exclusion criteria included patients who were discharged to hospice, died in hospital, required multiple surgical interventions for the cSDH, had greater than 50% acute SDH, or had concurrent intracranial hemorrhage other than SDH. Patients without phone contact information were also excluded. One patient was excluded due to having acute-on-chronic presentation. Of 90 total identified cSDH patients, 31 were deceased during the follow-up period, which is consistent with mortality rates in other published series,[2] and another 9 patients were ineligible due to aforementioned criteria.

Of the 50 eligible patients, 38 consented to participate in the survey. Ten patients were female (26.3%); 28 were male (73.7%). Average age at time of surgery was 75 years old; range: 56–87. Average time between surgery and survey was 1362 days. The surgical approach used for 31 patients was burr hole drainage, while 7 patients were evacuated through craniotomy. No patients had external drains placed following burr hole craniotomies; however, drains are routinely placed following craniotomy procedures. Thirty-two of 38 patients had a GCS score of 15 before surgery. The remaining six patients had GCS 14 with point reduction due to confused speech.

Of the participating patients, 35/38 (92.1%) reported that the surgery improved their neurologic symptoms and quality of life [Table 1]. Before surgery, 30/38 (78.9%) exercised regularly. Of those who exercised regularly, 28/30 returned to exercise within 1 year following surgery [Table 2]. Notably, one patient who did not exercise before surgery for cSDH began exercising regularly within 1 year following surgery. Patients who were not able to return to sport or regular exercise after surgery typically developed new health conditions such as CVA or cardiac dysfunction which limited activities. In two cases, patients described persistent headaches, exacerbated by vigorous activity, which limited sport participation.

Before surgery, 13/38 (34.2%) participated in hobby sports such as golf, tennis, and swimming. Of those 13 patients, 9 (69.2%)

Survey Questions:

1. Did surgery improve your neurological symptoms?
2. Did you exercise prior to surgery?
3. Were you able to return to regular exercise within one year after surgery?
4. Did you play sports such as golf, tennis, or swimming prior to developing symptoms from chronic subdural hematoma? If yes, did you return to play after surgery?
5. Did you participate in physical therapy following discharge after surgery? If so, was it helpful?

Figure 1: Questions asked through phone survey.

returned to playing sports within 1 year following surgery [Table 3]. All patients were evaluated by a physiotherapist in the hospital; however, for the purposes of this study, data regarding participation in physical therapy refer to PT after discharge. Postoperative physical therapy involvement was reported by 17/38 (44.7%) patients; 15/17 (92%) of those said that they found the physical therapy helpful in their recovery. Among the patients who participated in physical therapy, 82.4% exercised regularly following surgery, whereas 71.4% of the patients who did not complete any physical therapy after surgery returned to exercise [Table 4]. This difference was statistically significant ($P < 0.002$).

DISCUSSION

Chronic subdural hematoma is a condition found most commonly in elderly patients, with incidence increasing with every decade past 60 years of age.[1,6] Although cSDH is relatively common in the elderly and may frequently be treated with a straightforward surgical procedure, it is far from a benign process. A review by Miranda *et al.* found 32% mortality rate at 12 months in elderly cSDH cohort with a mean age of 80.[2] Another study comparing the immediate postoperative period in patients below and above age 50 found that the older group had higher rates of surgical complications during evacuation of cSDH and during recovery.[6] Stippler *et al*. retrospectively analyzed the recovery a cohort of cSDH patients aged 90 years and older and found that only 24% of patients recovered sufficiently to be discharged home, regardless of good GCS scores (14+) on admittance.[11]

Many studies on recovery following cSDH have focused on the acute hospitalization phase or the first 30 days after surgery. A systematic review by Chari *et al.* of 102 studies examining cSDH from 1990 to 2016 found only one study which examined outcome data at 18 months.[12] However, an interesting recent study examined the relative excess mortality of cSDH patients with age-matched population over the course of 25 years.[13] They found an overall excess mortality related to cSDH of 9% at 1 year, 27% at 10 years, and 48% at 20 years, independent of hematoma characteristics and recurrence.

While much has been written regarding survival, complications, and rates of recurrence following cSDH, little has been published regarding functional recovery and return to activity. A systematic review by Cunningham *et al.* found that a regular, moderate level of physical activity is associated with lower all-cause mortality and lower rates of falls, cognitive decline, dementia, and depression in patients aged 60 years and older.[14] An important goal for the patient and surgeon is to return the patient to regular exercise due to known health benefits. In our cohort, surgery improved symptoms and allowed the majority of our patients to return to exercise within 1 year of surgery. Participation in a physical therapy program associated positively with return to exercise.

Physical therapy has been found to improve functional outcomes in elderly patients recovering from various neurosurgical procedures.[15-17] However, no published studies exist evaluating the therapeutic impact of physical therapy interventions following cSDH evacuation. It is interesting to note that patients who participated in a physical therapy program after surgery returned to exercise at a significantly higher rate than those who did not complete any physical therapy (83% vs. 71%), although it is unclear, this difference is due to patient motivation to be challenged with physical activity, or due to the physical therapy intervention, or possibly a combination of both factors. Overall, our survey results support the claim that surgical evacuation of cSDH

Table 1: Overview of survey responses.

Did the surgery improve quality of life?	
Unsure	1 (2.6%)
No	2 (5.3%)
Yes	35 (92.1%)
Did the patient exercise regularly before the surgery?	
No	8 (21.1%)
Yes	30 (78.9%)
Did the patient play sports before the surgery?	
No	25 (65.8%)
Yes	13 (34.2%)
Did the patient participate in physical therapy?	
No	21 (55.3%)
Yes	17 (44.7%)

Table 2: Exercise before and after surgery.

	Overall (*n*=31)
Was the patient able to return to exercise	
Started after	1 (3.2%)
No	2 (6.5%)
Yes	28 (90.3%)

Table 3: Participation in sports before and after surgery.

	Overall (*n*=31)
Was the patient able to return to exercise	
No	4 (30.8%)
Yes	9 (69.2%)

Table 4: Rates of return to exercise according to participation in physical therapy.

	Patient returned to exercise within 1 year following surgery	
Patient participated in physical therapy	Yes	No
Yes (*n*=17)	14 (82.3%)	3 (17.7%)
No (*n*=21)	15 (71.4%)	6 (28.6%)

leads to subjective improvement of symptoms and quality of life, with a large majority of patients (92.1%) reporting improvement following surgery.

Limitations and further study

As with all surveys, this study is subject to the limitations of recall bias. In addition, the rate of regular exercise before cSDH among older adults treated at our facility (78.9%) may be higher than rates in the general population; this generally higher baseline level of activity may influence rates of return to exercise following surgery. It is also possible that some or all of the 13 patients who did not participate in the survey may have suffered poor outcomes. In this case, the percentage of patients who returned to sport or regular exercise would be falsely elevated.

This study highlights the need for additional research on this topic, including better prognostication about recovery after cSDH so that we can better educate patients and families. Further study is required to illuminate the factors contributing to high functional activity levels following surgical evacuation and to elucidate the optimal role, duration, and timing for physical therapy during recovery from cSDH.

CONCLUSION

In our small cohort, we found that surgery improved symptoms and allowed the majority of our patients to return to exercise within one year after surgery. Participation in a physical therapy program was positively associated with return to exercise. Further study is needed to determine which factors contribute to a return to baseline levels of physical activity following surgery for chronic subdural hematoma.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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