



Original Article

Isolated traumatic occipital condyle fractures: Is external cervical orthosis even necessary?

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ABSTRACT

Background: Occipital condyle fractures (OCFs) have been reported in up to 4–16% of individuals suffering cervical spine trauma. The current management of OCF fractures relies on a rigid cervical collar for 6 weeks or longer. Here, we calculated the rate of acute and delayed surgical intervention (occipitocervical fusion) for patients with isolated OCF who were managed with a cervical collar over a 10-year period at a single institution.

Methods: This was a retrospective analysis performed on all patients admitted to a Level 1 Trauma Center between 2008 and 2018 who suffered traumatic isolated OCF managed with an external rigid cervical orthosis. Radiographic imaging was reviewed by several board-certified neuroradiologists. Demographic and clinical data were collected including need for occipitocervical fusion within 12 months after trauma.

Results: The incidence of isolated OCF was 4% (60/1536) for those patients admitted with cervical spine fractures. They averaged 49 years of age, and 58% were male falls accounted for the mechanism of injury in 47% of patients. Classification of OCF was most commonly classified in 47% as type I Anderson and Montesano fractures. Of the 60 patients who suffered isolated OCF that was managed with external cervical orthosis, 0% required occipitocervical fusion within 12 months posttrauma. About 90% were discharged, while the remaining 10% sustained traumatic brain/orthopedic injury that limited an accurate neurological assessment.

Conclusion: Here, we documented a 4% incidence of isolated OCF in our cervical trauma population, a rate which is comparable to that found in the literature year. Most notably, we documented a 0% incidence for requiring delayed occipital-cervical fusions.

Keywords: Arthrodesis, Fractures, Occipital condyle, Orthosis, Trauma

INTRODUCTION

Occipital condyle fractures (OCFs) have been reported in up to 4–16% of individuals sustaining cervical spine trauma.^[11,13] Isolated OCF fractures are defined as those occurring without a concomitant fracture in the cervical spine. In 1988, Anderson and Montesano developed a classification system dividing OCF injuries into three categories based on the type of injury-causing force [Figures 2-4].^[2]

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The current practice guidelines typically support management of patients with OCF with a cervical collar for approximately 6 weeks or longer.^[4,11,16] Most sources recommend a semi-rigid collar for stable injury and rigid immobilization for a potentially unstable injury.^[12] This is largely based on expert opinion from case studies or case series.^[7,15,16,18] However, current management guidelines trivialize the complications associated with rigid orthosis such as dysphagia,^[10,17] aspiration pneumonia,^[14] and pressure ulcers.^[1,4,6,11]

Here, we analyzed the rate of delayed surgical intervention (occipitocervical fusion) warranted in patients with isolated OCF who were managed with a rigid cervical collar for 6 weeks or longer at a high-volume Level 1 Trauma Center over a 10-year period.

MATERIALS AND METHODS

All patients admitted to UPMC Presbyterian Hospital with OCF were analyzed from 2008 to 2018. All patients sustained an isolated traumatic OCF without other traumatic cervical injury [Figure 1]. The diagnoses of OCFs were confirmed on CT by several board-certified neuroradiologist. The variables that were analyzed are outlined in [Table 1].

RESULTS

Of the 1536 patients reviewed, 60 cases (4%) had OCF over the 10-year period [Table 1]. Patients had a median hospital stay of 4.5 days with a median ICU length of stay of 1 day. The median Injury Severity Score was 15.5. About 60% of patients were able to be discharge home from the hospital, while 20% went to an inpatient rehabilitation facility and 15% to a skilled nursing facility [Figures 2-4]. Out of the 60 patients cohort, none required acute or delayed occipital cervical fusion within 12 months postinjury. About 90% of

the cohort presented and were discharged neurologically intact, while 10% could not be assessed because of traumatic brain injury (TBI) or orthopedic injury [Table 2].

DISCUSSION

Isolated OCFs are found in only 4% of cervical trauma series. At present, most individuals with OCF are managed with a cervical collar (external orthosis).^[11]

In our cohort, no patient required surgery acutely or in delayed fashion to address occipitocervical instability or pseudoarthrosis. In addition, patients who were not limited by a TBI or other orthopedic injury were admitted and discharged with a normal neurological examination demonstrating that this fracture pattern poses very little to no risk of neurological injury in isolation.

Notably, rigid external cervical orthosis is associated with risk and complications that include aspiration pneumonia,

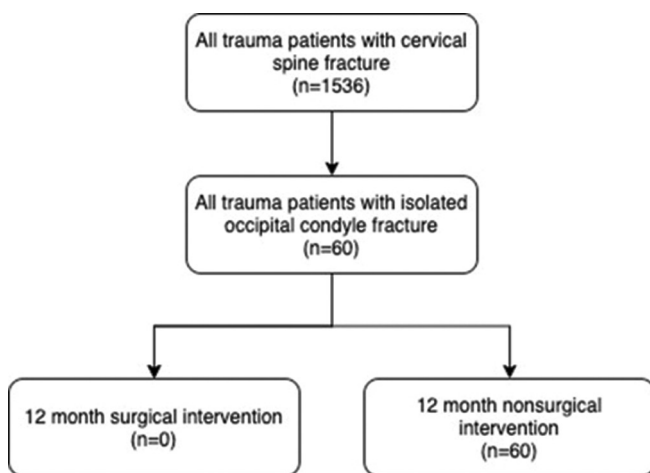


Figure 1: CONSORT flow diagram of the cohort included in this study.

Table 1: Cohort characteristics and demographics.

Location	UPMC Presbyterian	
Duration	2008–2018	
Patients reviewed	1536	
# of isolated occipital condyle fracture	60	3.9%
Age (median)	49 (18–86)	
GCS (median)	15 (3–15)	
Male gender	35	
Ethnicity		
Caucasian	55	91.7%
African-American	3	5.0%
Other	2	3.3%
Hospital LOS, (median, days)	4.5	
Intensive care unit LOS, (median, days)	1	
ISS, (median)	15.5	
Disposition		
Home	36	60.0%
IPR	12	20.0%
SNF	9	15.0%
LTAC	2	3.3%
AMA	1	1.7%
Mechanism of injury		
Fall	28	46.7%
MVA	15	25.0%
MCC	5	8.3%
ATV	2	3.3%
Assault	3	5.0%
Pedestrian	2	3.3%
Bicycle	4	6.7%
Unknown	1	1.7%

LOS: Length of stay, ISS: Injury Severity Score, IPR: Inpatient rehabilitation, SNF: Skilled nursing facility, LTAC: Long-term acute care, AMA: Against medical advice, MVA: Motor vehicle accident, MCC: Motor cycle crash, ATV: All-terrain vehicle

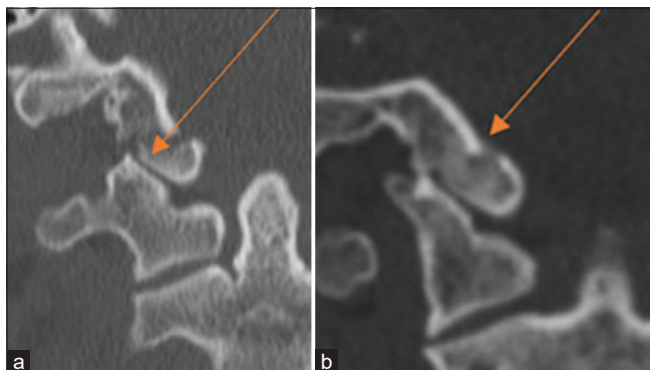


Figure 2: (a) A 29-year-old male with right Type I occipital condyle fracture. (b) One-month interval CT cervical spine – a 29-year-old male with right Type I occipital condyle fracture with evidence of nonsurgical fusion.

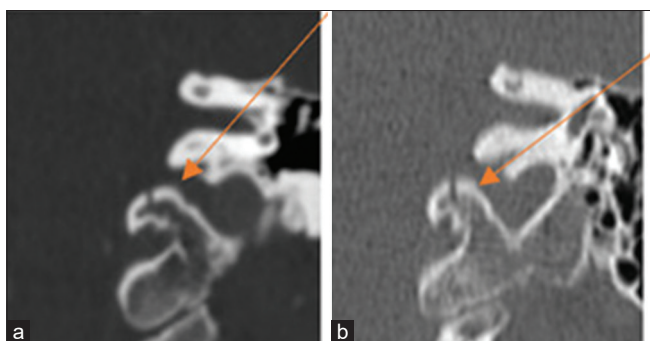


Figure 3: (a) A 42-year-old female motor cycle crash (MCC) with left Type II occipital condyle fracture with concomitant TBI, GCS 7T. (b) One-month interval CT cervical spine – a 42-year-old female MCC with left Type II occipital condyle fracture with concomitant TBI, GCS 7T with early signs of cortication of fracture line.

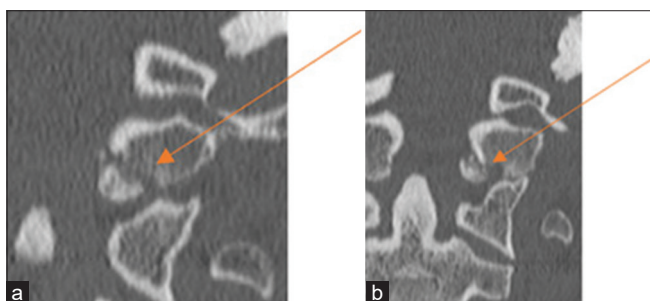


Figure 4: (a) A 32-year-old unrestrained MVC with left Type III occipital condyle fracture. (b) One-month interval CT cervical spine – a 32-year-old unrestrained MVC with left Type III occipital condyle fracture managed with cervical collar with early signs of cortication of fracture

limitation in driving, and/or other nonstrenuous activities of daily living, pressure ulcers, and cellulitis that can lead to bacteremia and possibly sepsis in vulnerable individuals.^[20] Haut *et al.* published a retrospective analysis studying 45,284 patients with isolated penetrating trauma

Table 2: Characteristic and management of patients.

Types of occipital condyle fractures		
Type I	28	46.7%
Type II	18	30.0%
Type III	14	23.3%
Neurological examination on admission and discharge		
Neurologically intact	54	90.0%
N/A (secondary to traumatic brain or orthopedic injury)	6	10.0%
External cervical orthosis	60	100%
Occipitocervical fusion (within 12 months of injury)	0	0%

wherein they found that mortality rates were twice as high braced versus nonbraced patients.^[8] In addition, other found that prehospital spinal stabilization was associated higher mortality and morbidity rates in trauma patients.^[3,5,19]

CONCLUSION

Sixty (4%) patients had isolated OCF out of 1536 patients presenting with traumatic cervical injuries, and none required acute and/or delayed occipital-cervical surgical fusions. Although historically, these fractures are primarily managed with an external cervical orthosis (C-collar), these findings provide a platform for prospective analysis comparing collar versus no-collar management for isolated OCF.

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Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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