



Review article

Indications and complications of crown halo vest placement: A review

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ABSTRACT

Crown halo vest placement remains an option for the treatment of a variety of upper and subaxial cervical spinal fractures. While the device remains a useful non-operative option for the treatment of these injuries, it has been associated with a variety of complications. This manuscript represents an up to date narrative review of the indications, complications, and complication avoidance for the placement of crown halo vests.

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1. Introduction

The original model of the modern crown halo vest was first introduced by Perry and Nickel in 1959 for the treatment of patients with poliomyelitis. Since then, the crown halo vest has become a staple device in the management of some unstable cervical spine injuries. Crown halo vest placement offers better stabilization to traditional rigid collar placement but less stabilization compared to operative fixation and fusion [1,2]. While the device remains a useful non-operative option for the treatment of cervical spine trauma, it has been associated with adverse complications, particularly pin-related complications. Pin loosening and pin-site infection are two common pin-related complications that have been reported in the literature, however, other more infrequent but more serious complications and their overall incidence including dural penetration, orbital cellulitis, pneumocranium, and subdural hematomas have also been reported. The aim of this manuscript is to present a comprehensive review of the current indications and complications of the crown halo vest in the treatment of injuries to the cervical spine.

2. Indications

Indications for crown halo vest placement include atlas burst fractures, type II hangman fractures (Figs. 1–3), type II and III odontoid fractures, C2 comminuted fractures, and combinations of C1

and C2 fractures [3]. All patients with Hangman's fractures with varying degrees of C2/C3 subluxation in a study by Cooper et al. whom underwent crown halo vest treatment resulted in complete fracture healing and cervical spine stabilization [4]. On the other hand, a study by Bransford et al. determined that a significant percentage of failed crown halo vest patients suffered odontoid fractures, with 54% of the failed halo vest patients comprising of patients with odontoid fractures, while only 32% of successful halo vest patients suffered odontoid fractures [5]. This contradicts previous literature showing crown halo vest therapy being efficacious in the treatment of odontoid fractures, although the authors suggest that if the odontoid fracture is displaced and in a patient greater than 40 years of age, or if the displacement is greater than 4 mm, then it's recommended they undergo fusion instead [4,6]. Of the 311 patients analyzed in their study, Bransford et al. reported 1 patient with occipito-cervical dislocation undergoing crown halo vest unsuccessfully and requiring surgical management instead [5].

In a review of 245 cases by Glaser et al., they found no patients undergoing crown halo vest therapy developed neurological injury or neurological progression despite loss of fracture reduction [7], a result in agreement with some studies in the literature [4,5,8]. On the other hand, this is contradictory to other studies in the literature which have found crown halo vest therapy doesn't prevent neurological injury in patients with cervical spinal instability [2]. In such cases, surgical treatment may be required in addition to the crown halo vest treatment. Surgical treatment following crown halo vest therapy is particularly relevant for patients suffering osseous injury to both anterior and posterior spinal columns that may in fact, mask an underlying ligamentous injury [7,9], or when

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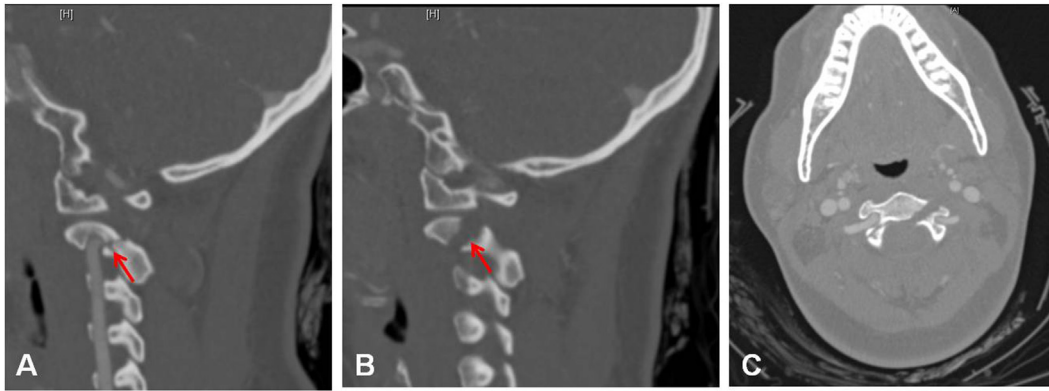


Fig. 1. A 21-year old female suffered a motor vehicle accident. Spinal precautions were maintained at the scene and she was transported to the emergency room at our hospital. She complained of neck pain and her neurological examination was normal. A Computer tomography scan was obtained revealing a Hangman's fracture type 1. Note the bilateral pars interarticularis fractures on the sagittal CT reconstruction (A, B, Arrows), as well as the axial CT (C). The patient was placed in a crown halo vest.



Fig. 2. Picture depicting the patient in a crown halo vest. Note the position of the frontal pins just lateral to the midpupillary line intersecting with the equator (A). This is in order to avoid violation through the frontal sinus. Note the neutral position of the head and neck (B), to avoid dysphagia.

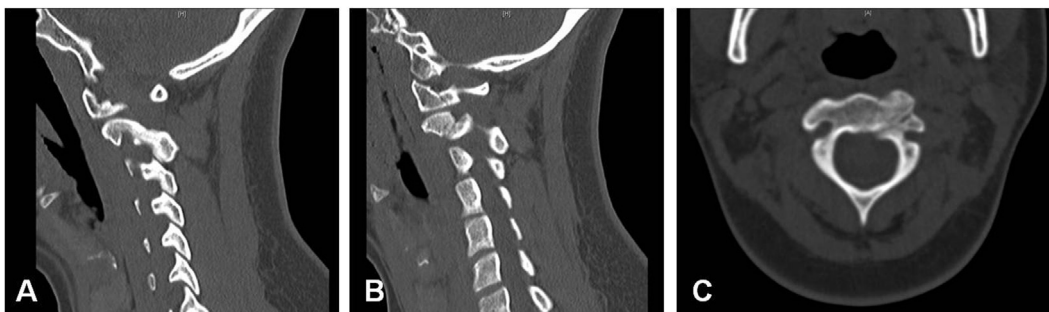


Fig. 3. CT demonstrating healing of the bilateral pars interarticularis of C2 fractures, also known as Hangman's fractures in the sagittal plane (A and B), and axial plane (C) following 3 months of crown halo vest placement.

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