Odontoid fracture case series

Thirty-seven odontoid fractures were reduced and treated by anterior odontoid screw fixation using the Herbert screw. There were 37 patients whose age ranged from 20 to 79 years. Three-dimensional CT scans were obtained for all patients to assess the screw position, the presence of the penetration of superior cortex of dens, the extent of reduction of fracture displacement and fracture gap.

Mean fracture displacement was 2.6 ± 3.2 mm before surgery; after the operation this value was 1.0 ± 1.5 mm. The difference in fracture gap between the preoperative and the postoperative state was -0.1 ± 1.1 mm, which was not statistically significant (P = 0.667). We achieved cortical purchase in only 16 of 37 patients (43.2%), but cortical purchase was not obtained in 21 patients (56.7%) due to the fear of the risk of the damage of neural and vascular structures. Of these 21 patients, who had no penetration of the superior cortex of dens, widening of the fracture gap occurred in 12 patients (57%), no change in 6 patients (29%), and there was shortening in 3 patients (14%). However, of 16 patients with penetration of apical dens tip, we achieved significant reduction of fracture gap (P =0.002).

To maximize at reduction of fracture gap using the Herbert screw, it is essential to penetrate the apical dens tip [1)].

2012

prospectively evaluated sixty-nine consecutive patients who presented to our institution with a dens fracture. The mean duration of follow-up was 9.7 months (range, six to fifty-eight months). Fractures were categorized as stable or unstable. Stable fractures were treated by immobilization in a rigid collar. Patients seventy-five years or older with unstable fractures, patients with a neurological deficit, and patients with Anderson and D'Alonzo type-III fractures underwent posterior transarticular C1-C2 stabilization. Unstable fractures in patients younger than seventy-five years were stabilized with direct anterior screw fixation. Thirty-one patients were treated with a Philadelphia collar, twenty-five with posterior transarticular fixation, and thirteen with direct anterior screw fixation. RESULTS: Fracture-healing or solid fusion of C1-C2 was documented in sixty-eight of sixty-nine treated patients at final follow-up. The remaining patient had a stable nonunion of the dens. Secondary procedures were performed in five patients. CONCLUSIONS: Our treatment algorithm based on dens fracture type, fracture stability, and patient age was associated with a high success rate. Evaluating fracture stability is crucial when considering nonoperative treatment. External stabilization with a rigid cervical collar was adequate for stable fractures of the dens and was associated with a high healing rate. Posterior transarticular screw fixation of C1-C2 was associated with a high success rate, including in elderly patients. LEVEL OF EVIDENCE: Therapeutic Level III [2)].

2011

From April 1997 to December 2008, we treated a total of 60 patients with upper cervical spine injuries. This study included 31 (51.7%) patients (22 men, 9 women; mean age, 39.3 years) with types II and III odontoid process fractures. The average follow-up was 25.1 months. We reviewed digital radiographs and analyzed images according to type of injury and treatment outcomes, following conservative treatment with HVI and surgical management with screw fixation. RESULTS: There were a total of 31 cases of types II and III odontoid process fractures (21 odontoid type II fractures, 10 type III fractures). Fifteen patients underwent HVI (10 type II fractures, 5 type III fractures). Nine (60%) out

of 15 patients who underwent HVI experienced successful healing of odontoid fractures. The mean period for bone healing was 20.2 weeks. Sixteen patients underwent surgery including anterior screw fixation (6 cases), posterior C1-2 screw fixation (8), and transarticular screw fixation (2) for healing the odontoid fractures (11 type II fractures, 5 type III fractures). Fifteen (93.8%) out of 16 patients who underwent surgery achieved healing of cervical fractures. The average bone healing time was 17.6 weeks. CONCLUSION: The overall healing rate was 60% after HVI and 93.8% with surgical management. Patients treated with surgery showed a higher fusion rate and shorter bony healing time than patients who received HVI. However, prospective studies are needed in the future to define better optimal treatment and cost-effective perspective for the treatment of odontoid fractures [3].

1999

Henry et al. reviewed 81 patients with fractures of the odontoid process treated between May 1983 and July 1997, by anterior screw fixation. There were 29 patients with Anderson and D'Alonzo type-II fractures and 52 with type III. Roy-Camille's classification identified the direction and instability of the fracture. Operative fixation was carried out on 48 men and 33 women with a mean age of 57 years. Associated injuries of the cervical spine were present in 15 patients, neurological signs in 13, and 18 had an Injury Severity Score of more than 15. Nine patients died and 11 were lost to follow-up. Of 61 patients, 56 (92%) achieved bony union at an average of 14.1 weeks. Two patients required a secondary posterior fusion after failure of the index operation. A full range of movement was restored in 43 patients; only six had a limitation of movement greater than 25%. We conclude that anterior screw fixation is effective and practicable in the treatment of fractures of the dens [4].

1996

Polin et al. retrospectively analyzed the results with the nonsurgical management of odontoid fractures to ascertain whether cranial fixation affected overall outcome. Fifty-four patients managed at the University of Virginia Health Sciences Center, Charlottesville, VA, between 1976 and 1994 were studied. All 18 patients with Type III fractures (5 treated in the collar, 18 in the halo vest) demonstrated fracture healing and late stability. Among 36 individuals with Type II fractures, 20 were treated in the halo vest and 16 were managed in the Philadelphia collar or similar orthoses. The overall rate of late surgical intervention, the stability to flexion and extension, and the rate of bony fracture healing were not statistically different between the methods of immobilization. The rate of bony union was not significantly higher in the halo vest group (74 versus 53%), even though patients managed in the Philadelphia collar were significantly older than those in the halo vest (mean, 68 versus 44 yr). In general, nonsurgical management of Type III odontoid fractures was recommended, accompanied by use of a cervical orthosis. The determination of operative versus nonoperative treatment for Type II fractures was made on the basis of fracture anatomy, patient age, other associated injuries, and patient preference. The lack of a significant difference in the need for late surgical procedures or late instability, improved patient comfort with the cervical orthosis, and elimination of the risk of halo-related complications favored the use of the rigid cervical orthosis in the majority of these cases [5].

1993

Sixteen patients with diagnosis of their odontoid fractures delayed from four months to 45 years have

been studied and treated. Three had forgotten about the injury and, in the rest, the significance had been minimized by their clinicians. Fifteen patients had characteristic C-2 nerve root pain and 10 had noted weak hands and walking difficulties. Fifteen patients had Type II fractures, which were mobile in 11; hypertrophic pseudoarthrosis was marked in two. In seven patients it was confirmed at surgery that all or part of the transverse ligament was interposed in the fracture. Transoral surgery, combined with a variety of posterior fusion techniques, has allowed cord decompression, an understanding of the pathomechanics, and sound posterior bone fusion with arrest of the myelopathic condition. Measurements of craniovertebral angles and cord cross-sectional area in this series revealed a rough correlation, but the most striking relationship was between length of delay in diagnosis and diminished cord area in both non-union and malunion, suggesting a progressive injury mechanism. It is proposed that late myelopathy following odontoid fracture may be more common than hitherto believed and should be considered in the evaluation of patients with cervical spondylosis. The condition may be progressive. Finally, non-union may be due to interposition of the transverse ligament [6].

1)
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