EUROSPINE

Xi'an Hong Hui Hospital
Xi'an, Shaanxi, China

Prospective, Self-controlled, Comparative Study of Transposterior Arch Lateral Mass Screw Fixation and Lateral Mass Screw Fixation of the Atlas in the Treatment of Atlantoaxial Instability

Dingjun Hao, Baorong He, Liang Yan

Hong Hui Hospital, Xi'an Jiaotong University College of Medicine, Xi'an, Shaanxi 710054, China

ABSTRACT

PURPOSE

The aim of the present study was to compare the application and clinical outcomes of transposterior arch lateral mass screw and lateral mass screw fixation of the atlas in the treatment of atlantoaxial instability.

Xi'an Hong Hui Hospital, Xi'an, Shaanxi, China

METHODS

From June 2006 to February 2011, 66 patients with atlantoaxial instability were randomly assigned for treatment with transposterior arch lateral mass screw or lateral mass screw fixation of the atlas, combined with axis pedicle screw fixation. Patients were followed up regularly. The operation time, blood loss, intraoperative complications, Japan Department of Orthopedics Association Score, visual analog scale score, and bone fusion rates were recorded.

RESULTS

The operation was successful in all 66 cases, with all patients showing improvement in clinical symptoms. There were significant differences in operation time and blood loss between the 2 groups (P < 0. 001). The mean follow-up time was 49 months. At the final follow- up, the Japan Department of Orthopedics Association score was significantly better than the preoperative score (mean, 13.5; P < 0 .05). The mean postoperative improvement rate was 88.2% and the mean visual analog scale score was 1. 9; both results were significant as compared with preoperative results (P < 0.05). Bone fusion was achieved within 6 months after operation. No screw loosening, shifting, breakage, or atlantoaxial instability was observed. Six patients with atlas lateral mass screw placement had burst bleeding of C1–C2 venous plexus during surgery. Five patients had immediate pain and numbness at the occipitocervical region.

Xi'an Hong Hui Hospital, Xi'an, Shaanxi, China

CONCLUSIONS

Atlas transposterior arch lateral mass screw fixation is less invasive, simple, has fewer complications, and offers good fixation results for atlantoaxial instability as compared with lateral mass screw fixation.

Key words: atlantoaxial instability, atlantoaxial fixation, atlas screw, lateral mass, vertebral artery, pedicle, complications

Xi'an Hong Hui Hospital, Xi'an, Shaanxi, China

Figures and Tables

FIGURE 1. Entry points of atlas transposterior arch lateral mass screw and atlas lateral mass screw

Xi'an Hong Hui Hospital, Xi'an, Shaanxi, China

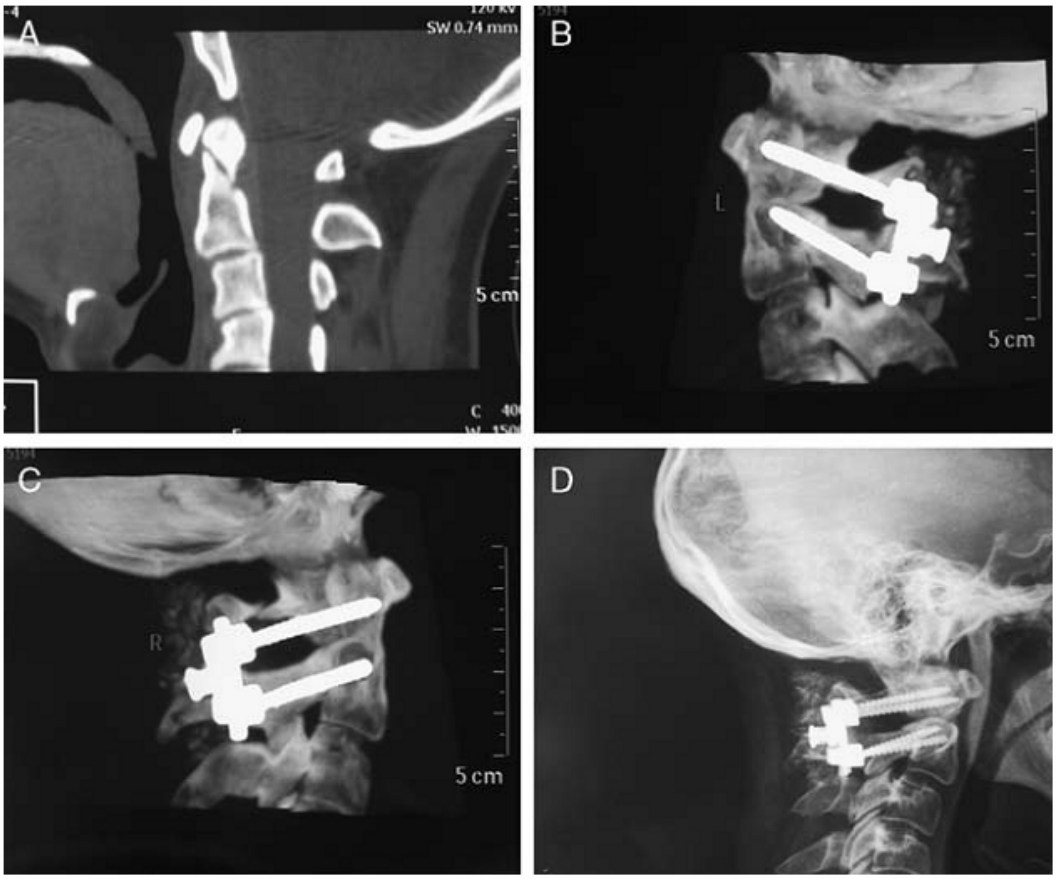

FIGURE2. A 27-year-old man who presented with an odontoid fracture underwent atlantoaxial fusion and internal fixation (A). Sagittal reconstruction computed tomography scans show atlas transposterior arch lateral mass screw and axis pedicle screw fixation (left) (B), and atlas lateral mass screw and axis pedicle screw fixation (right) (C). Postoperative lateral x-ray of atlantoaxial internal fixation(D).

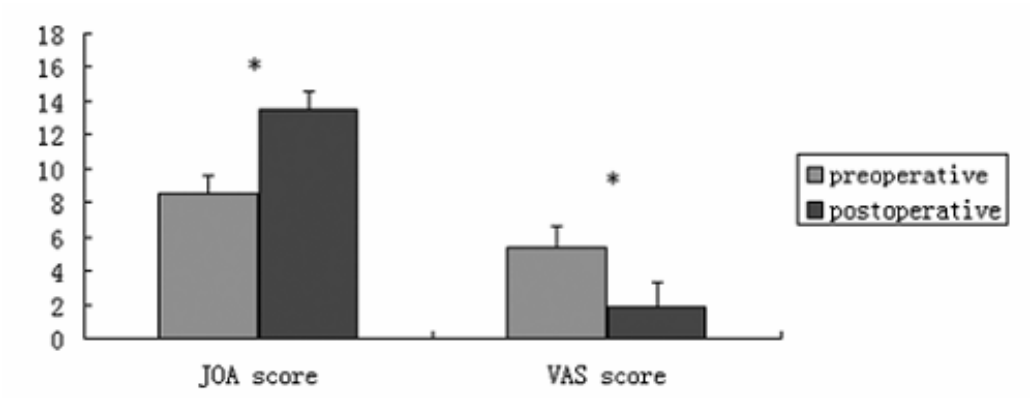

FIGURE3. Comparison of clinical outcomes [Japan Department of Orthopedics Association (JOA) Score, visual analog scale (VAS) score] between transposterior arch lateral mass screw fixation and lateral mass screw fixation (*P < 0.05).

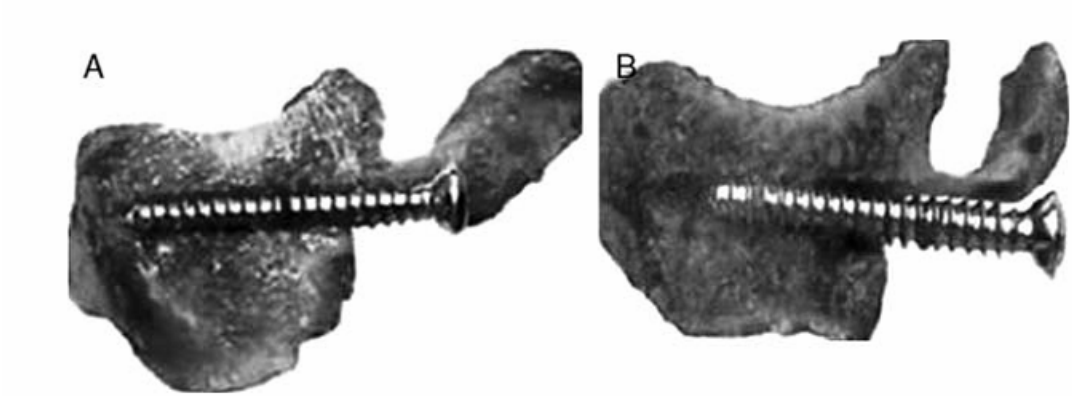

FIGURE 4. Trajectories of atlas transposterior arch lateral mass screw (A) and atlas lateral mass screw (B) fixation techniques.

TABLE 1. Injury Causes and Diagnoses of the Study Patients

	No. Patients
Injury Causes	
Traffic injury	35
Falling injury	18
Heavy injury	8
Slip injury	5
Diagnoses	
Anderson type II odontoid fracture	16
Anderson type III odontoid fracture	11
Congenital isolated odontoid abnormality	14
Transverse atlas ligament rupture	21
Rheumatoid arthritis	4

TABLE 2. The Intraoperative Comparison Between Transposterior Arch Lateral Mass Screw and Lateral Mass Screw

Internal fixation	Operation Time (min)	Blood Loss (mL)
Transposterior arch lateral mass screw*	15 ± 4	120 ± 40
Lateral mass screw*	34 ± 7	240 ± 70
t	19.15	12.09
P	< 0.001	< 0.001

*Values are the mean ± SD.

Disclosure of Conflicts of Interest

We certify that all our affiliations with or financial involvement in, within the past 5 years and foreseeable future, any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript are completely disclosed.

Xi'an Hong Hui Hospital, Xi'an, Shaanxi, China