



# Occipito-cervical fixation in rheumatoid arthritis and posttrauma patients, using the OCAM fixation system. Short report

© J ORTHOP TRAUMA SURG REL RES 4 (16) 2009

Original article

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## Statistic

|            |     |
|------------|-----|
| Word count | 643 |
| Tables     | 0   |
| Figures    | 4   |
| References | 6   |

Received: 01.09.2009

Accepted: 28.09.2009

Published: 15.10.2009

## Summary

Occipito-cervical fixation is used in rheumatoid arthritis patients with atlanto-axial subluxation and sub-axial instability or vertical displacement of the odontoid. To date, plates with hooks, wires or screws have been used to achieve internal fixation. We performed a clinical trial with a fixation system that uses bicortical / unicortical occipital clamps and lateral mass / pedicle screws or laminar clamps (OCAM System LFC Poland) for vertical displacement of the odontoid in two rheumatoid arthritis patients and one trauma patient.

Material and methods: two women and one man (32 – 81 years) were treated. All 3 patients were intubated awake. They were turned prone into the operating table under fluoroscopic vision. A three point head fixation system was used for stabilization. The foramen magnum was opened and the posterior arch of c1 was removed. Trans-operative neuromonitoring was used in one patient. A rectangular orifice was drilled on both sides of the midline of the occipital bone and the ocam clamps were introduced and rotated so as to secure them between the inner and outer table. Similar holes were drilled bilaterally on c2, c3 or c4 laminas. Clamps were secured either uni or bicortically. Two titanium rods were connected and secured to the clamps. A cancellous rib autograph was used to obtain fusion. Patients were followed clinically and radiographically for at least 6 months (range 6 – 14 months).

Results: no immediate postoperative complications were observed. All 3 patients experienced improvement in neck and head pain. All three remained neurologically stable.

Conclusion: this preliminary report confirms the usefulness of the ocam system that achieves internal fixation with a straight forward surgical technique that offers the possibility of avoiding the potential complications of lateral mass or pedicular screws with laminar clamps. Longer follow up is needed to draw final conclusions.

**Key words:** occipitocervical fusion, rheumatoid arthritis, cervical instrumentation, craniocervical instability, superior migration of the odontoid

Occipitocervical fusion has been attempted for more than 50 years. To date, we are still searching for the ideal system. The unique anatomical characteristics of the craniocervical junction are a formidable challenge, leading to suboptimal results in more than a few cases. The joint angle between the suboccipital skull and the cervical spine is almost perpendicular (1). The first two cervical vertebrae are responsible for nearly 50% of the rotational motion (2), and bone grafts placed at that junction are usually not subjected to compressive loads.

All these anatomical factors plus alterations caused by disease processes like cranial settling or atlanto-axial subluxation, place additional demands on non-rigid constructs that would probably do well on other spine segments.

Roi-Camille et al. succeeded in achieving rigid sub-axial fixation introducing cervical lateral mass plates more than 20 years ago (3). Upward extension of this system to achieve occipitocervical fixation seemed a natural step forward.

In our experience, lateral mass and pedicular screws in the cervical spine have proven to be a far more challenging procedure than initially thought. Specially in

obese or short necked patients where fluoroscopic visualization can be difficult.

We report our preliminary results in three cases with the use of a rigid occipitocervical fixation system (OCAM, LFC, Zielona Góra, Poland). Occipital clamps and a combination of lateral mass screws or laminar clamps were used to obtain solid rigid fixation. Autologous rib was used to obtain fusion.

## CLINICAL MATERIAL AND METHODS

Two women ages 42 and 51 years underwent surgery for rheumatoid arthritis in which vertical instability was present. One 81 year-old gentleman who suffered traumatic fracture dislocation of the craniocervical junction was operated on. In all three patients the Ocam occipitocervical fixation system was used.

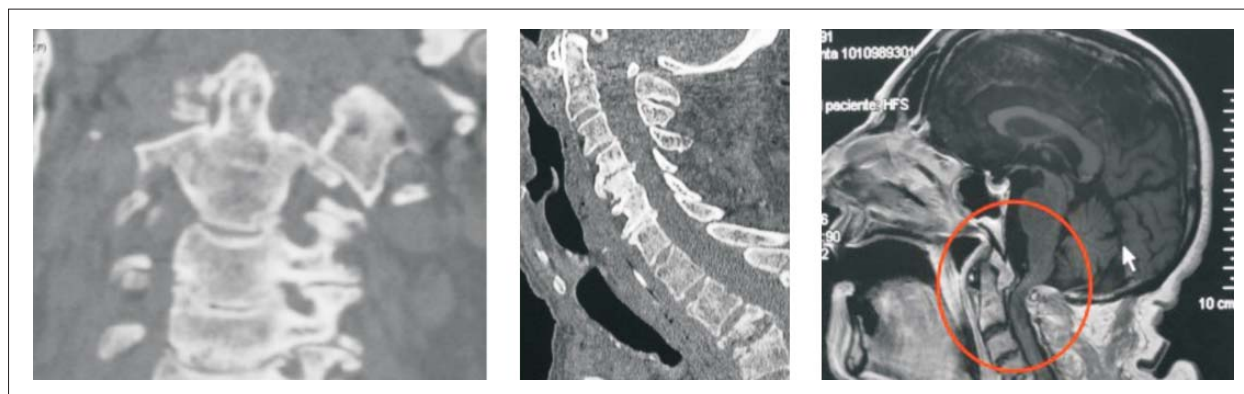
## RESULTS

In two patients, unicortical clamps were placed in the suboccipital squama. In one patient, the squama proved to be too thin so bicortical clamps were placed.

The foramen magnum was opened with the use of a high speed drill and Kerrison rongeurs. The posterior



**Fig. 1.** Imaging studies obtained in a 51 year-old female with rheumatoid arthritis. **Left.** Antero-posterior CT scan showing superior migration of the odontoid. The patient presented with intractable headaches and axial neck pain. She was otherwise intact. **Center.** Intraoperative photograph showing Ocam system in situ. **Right.** Postoperative lateral radiograph showing occipital and laminar clamps



**Fig. 2.** Imaging studies obtained in a 81 year-old male. **Left.** Antero-posterior CT scan revealing lateral atlantooccipital dislocation. The patient experienced difficulty swallowing and presented with pneumonia. He was otherwise intact. **Center.** Lateral CT scan showing atlantooccipital anterior dislocation. **Right.** Magnetic resonance image showing anterior atlantooccipital subluxation with medullary compromise. The patient fell down from a tree. He walked to the emergency department two weeks later referring difficulty swallowing

arch of C1 was similarly removed. No subaxial laminectomies were performed.

In all three cases, neural decompression was achieved. In two patients reduction was attempted and the fusion was obtained in the neutral position (Fig. 1). In the trauma patient, in spite of posterior decompression neck extension was not possible due to evoked potentials alterations. The patient was fused in situ with a slight lateral and forward flexion (Fig. 4).

## DISCUSSION

Traditional methods in which bone grafts secured with sublaminar wire are used to obtain occipitocervical fixation are still performed. These procedures offer little immediate stability and require the use of external orthosis. System failure remains a real concern.

Rigid systems that use occipital screws and sub-laminar hooks provide immediate stability, but are not free from complications. It is not uncommon for the spinal cord to be injured by compression (4,5). Systems that use lateral mass or pedicle screws have proven to afford rigid immediate stability (6). Technical complications remain important and image guiding techniques are

a welcomed help. This technology however, is not always available.

The Ocam system offers the possibility of providing rigid fixation through the combination of laminar or facet clamps that avoid the risk of neurological injury due to a misplaced screw.

## CONCLUSIONS

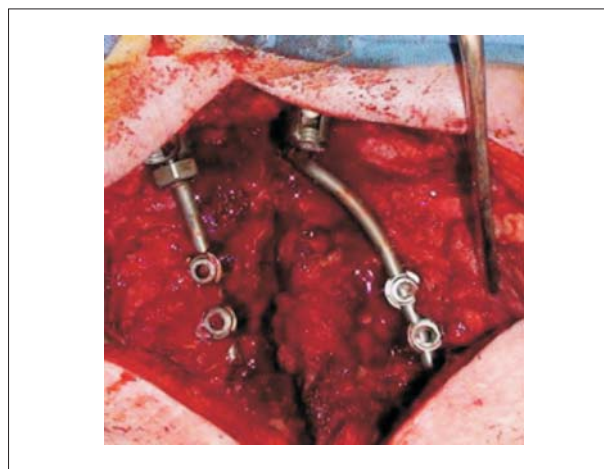
A preliminary experience with three cases using the Ocam system with a minimum of 6 months follow up is presented.

The system seemed to us to be user friendly. Rigid immediate fixation with little risk of spinal cord injury in the absence of image guidance was obtained. No pullout or system failure was observed during follow up.

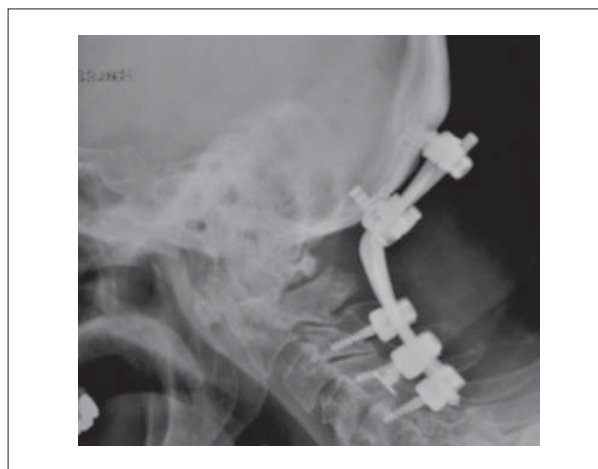
Although complications may not be completely eliminated, we expect successful results as more experience and longer follow up are obtained.

## Acknowledgements

The author would like to thank his 13 year-old son Daniel Suárez-Hernández for his computer skills and his valuable help in preparing and editing the images used in this report.



**Fig. 3.** Intraoperative photograph showing important lateral displacement that could not be reduced. The titanium rod was bent to obtain fixation in situ. A combination of screws and clamps was used



**Fig. 4.** Postoperative lateral radiograph showing the Ocam system in place. Notice the combination of screw and laminar clamp in C4

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