

Scottish Spine Surgeons

~9th Meeting - 2016 - Aberdeen



First Day (Friday 11/11/2016)

10:00 – 12:30	Session 1 (Chair: Mr Craig)		
	10:00 – 11:00	Recent advances and progress in Neuromodulation	Dr Saravana Kanakarajan Aberdeen Royal Infirmary
	11:00 – 11:40	Recovery from SCI: A Paralympian's Experience	Ms Karen Darke
	11:40 – 12:30	Medicolegal issues in Spinal Practice	Ms Isabel West
12:30 – 13:30	Lunch Break		
13:30 – 15:30	Session 2 (Chair: Mr Walkden)		
	13:30 – 14:30	Enhanced Recovery in Spine surgery	Mr Sandeep Konduru Univ. Hospital of North Midlands
	14:30 – 15:00	Cauda Equina Compression <i>Trainee education session</i>	Mr Sonnie Khan Western General - Edinburgh
	15:00 – 15:30	Syrinx and Chiari Malformations <i>Trainee education session</i>	Mr James Galea Ninewells Hospital Dundee
15:30 – 16:00	Adult Spinal Deformities <i>Trainee education session</i>	Mr Odhran Murray Queen Elizabeth Univ. Hospital, Glasgow	
16:00 – 16:30	Tea Break		
16:30 – 18:00	Case Discussions Session (Chair: Mr Frost)		

End of First Day

Second Day (Saturday 12/11/2016)

	Session 3 (Chair: Mr Bodkin)		
09:30 – 10:30	09:30 – 10:30	Malignant spinal lesions: Progress on systemic and local therapies	Dr Marianne Nicolson Aberdeen Royal Infirmary
10:30 – 11:00	Tea Break		
11:00 – 12:30	Free Papers Session (Chair: Mr Bodkin)		
12:30 – 13:00	Prizes and Closing Speech		
13:00 – 14:00	Lunch and Depart		

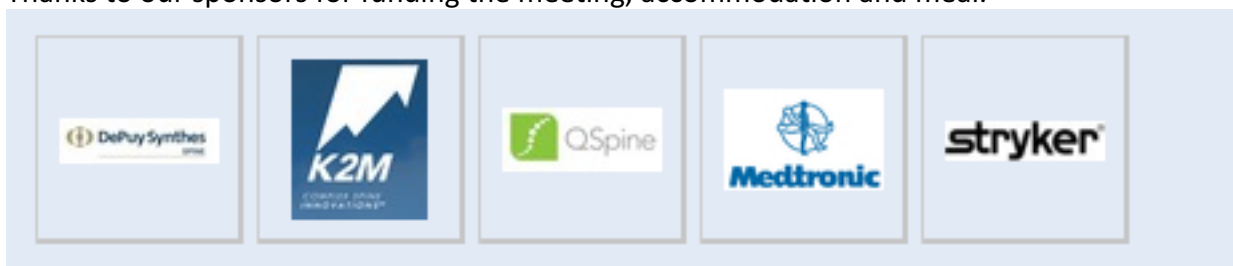
As surgeons based in the Scottish Health Service providing care for patients with conditions of the spine we want to share best practice. This forum and website (www.spinesurgeons.scot) are for healthcare professionals involved in spine surgery care at present, but who knows what the future will bring. Our annual informal and friendly gathering helps us to achieve our best clinical care for patients now and in the future.

An award of 6 hours CPD for Friday and 3 hours CPD for Saturday have been approved by the Royal College of Surgeons of Edinburgh (Recognition number – RCSEd01827).

The venue for our ~9th Scottish Spine Surgeons meeting is at the Caledonian Hotel, 10 Union Terrace, Aberdeen, AB10 1WE.

Accommodation for the Thursday and Friday evening will be at the Caledonian Hotel, 10 Union Terrace, Aberdeen, AB10 1WE.

Thanks to our sponsors for funding the meeting, accommodation and meal.



We wish you all a safe trip and look forward to seeing you here so that we can enjoy discussing the spine.

Best wishes

The Spine Team, Aberdeen

Organisers Scottish Spine Surgeons meeting 2016 – Aberdeen

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Web page: www.spinesurgeons.scot

Papers for Presentation.

Any health care professional can submit an abstract for presentation. As in previous years the presentations have to be about spine surgery and include a minimum of three patients on a topic. Both research and audit presentations are equally welcome. Presentations are all podium for a maximum of 6 minutes with up to 4 minutes for questions.

The presenters of the trainee forum will decide on the papers to be presented and will award the prizes. There will be two presentation prizes, a **first and runner up this year**. To be eligible to enter you must be a trainee, medical student or other health care professional or trainee. To be awarded the eligible person must be the person presenting. The running order below is in date order of abstract submission.

Saturday 12th, 1100hrs. Research and audit free papers.

11.00 Prioritisation of MRI Resources in the West of Scotland for the Assessment of Suspected CES –

Kevin Agyemang, Glasgow

Authors: Mr K Owusu-Agyemang, Mr D Bennett, Mr P Bhattathiri

Institution: Institute of Neurological Sciences, Glasgow.

No Conflict of interest. No funding

Background: The availability of MRI scanners outside a neurosurgical unit has significantly increased. The resource in conjunction with good clinical assessment remains indispensable in managing patients with suspected cauda equina syndrome (CES).

Methods: Retrospective review of Institute of Neurological Sciences (INS) neurosurgical referral database and imaging system analysis. All referrals for spinal MRI imaging between 17:00 on Friday and 08:00 on Monday were identified from a database of all referrals to our neurosurgical unit between 1st January and 31st March 2016. We assessed the number of referrals made, patients transferred for imaging, the outcome of the imaging along with the availability of a MRI list at the referring hospital.

Results: 38 referrals were made for weekend spinal MRI imaging. 18 patients (47%) were transferred to the INS. 58% of patients transferred for MRI could have been done locally. 79% of local MRI scans experienced unnecessarily delayed. Significant pathology was present in 24% of all cases, with 28% of transferred patients undergoing emergent/ urgent surgery.

Conclusion: Despite the publication of 'Standards of Care for Suspected and Confirmed Compressive Cauda Equina Syndrome' by BASS and SBNS in January 2016, there still remains some way to go in achieving the appropriate prioritisation of MRI resources. Clinicians and managers of MRI resources outside neurosurgical units must apply the recent standards to elective weekend MRI lists to prevent disability to patients and costs to the health service from missed complete CES.

11.10 Improving the Patient Journey through the Outpatient Spinal Service – Ignatius Liew, Glasgow

Authors: Ignatius Liew MBChB, Odhrán Murray FRCS (Tr and Orth)

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Conflicts of Interest: No conflict of interest. Funding source: No funding obtained.

Background context: The demand for outpatient spinal appointments significantly exceeds our services ability to provide efficient, high quality patient care. Currently, magnetic resonance imaging (MRI) of the spine is requested following first consultation.

Aim / Purpose: We aim to define if MRIs can accurately be requested based on information provided in the general practitioner (GP) referral and therefore, streamline the patient journey.

Study design / Setting: Prospective cohort study / Outpatient department.

Patient Sample: All primary care referrals to the spine service over a 12-week period.

Outcome Measures: Positive predictive value (PPV), negative predictive value (NPV), sensitivity and specificity of ordering MRI scans based on GP referral letters. Health economics of service redesign were examined.

Methods: During routine vetting of GP referral letters, three consultant spinal surgeons recorded how likely each patient would have a MRI scan. Subsequently, following the first consultation with the spinal service, the notes of each patient were reviewed to see if a MRI was requested or not.

Results: 149 patients were included (101 females, 48 males, mean age 49 (16-87)). There were 125 routine, 21 urgent, and 3 urgent-suspected cancers referrals. The PPV of ordering MRIs before first consultation was 84%, NPV was 56% with the sensitivity and specificity were 82% and 59% respectively. Ordering MRIs during initial vetting could shorten the patient journey by 115 days and projected to save £422,988 annually.

Conclusions: MRI scans can be effectively ordered based on the information provided by the GP referral letter. Requesting MRI scans early in the patient journey can save considerable time, improve care, and deliver cost savings. (248 words)

11.20 **An Appraisal of the Aberdeen Spinal MDT, Analysis of Activity and Clinician Feedback** – Andrew Hall, Aberdeen

Authors: abstract awaited.

Institution:

Conflicts of Interest:

11.30 **Type Two Odontoid Fracture in the Elderly and Atlanto-Odontoid Fusion or Calcification of the Transverse Ligament of Atlas: Anatomically Close Structures, Correlation or Causation?** – Ali Rajabian, Glasgow

Authors Ali Rajabian , Mehdi H, Grevitt MP

Institution Nottingham Spine Centre, The Centre for Spinal Studies and Surgery, Queen's Medical Centre, Nottingham University Hospital

Introduction & Aim: We hypothesised that etiologic mechanisms in the current literature have not adequately investigated the specific correlation/causation of this common pathology.

We explored the possible association of Type 2 Odontoid fracture in elderly with Atlanto-Odontoid Fusion and/or Calcification of the transverse ligament of Atlas.

Materials & Methods: 60 cases of C2 fractures aged 50-94 years were investigated for radiologic evidence (CT on admission) of fusion of Odontoid to anterior arch of Atlas as well as Calcification of transverse ligament of Atlas. Extent of both phenomenon were graded.

The extent of observed fusion was graded G0 to G3 as: 'Not fused' to 'Completely fused' while the extent of ligament calcification was graded G0 to G4 as: 'Not calcified' to 'Extensively calcified'.

To minimise observer grading variation/bias all the cases were first graded by single observer against a pre-fixed grading chart. Subsequently randomised samples were reassessed by three blinded observers against the grading charts. Finally any discrepancy of grading found between the observers were reassessed and averaged (where possible) or excluded if inconclusive.

Results: All (100%) had sustained the fracture by mechanical fall, of the verified Type 2 Odontoid fractures (n=22), 77% (17) had evidence of fusion ranging from less than 1/3 contact area fused 36% (8), to extensive fusion of Odontoid to Atlas 27%(6).

Whereas only 30% (7) had calcification of the ligament of which half 14% (3) had extensive calcification.

Discussion: 77% of the geriatric Type 2 Odontoid fractures due to mechanical fall had associated fusion of the Odontoid process to anterior arch of Atlas. Moreover, Type 2 fracture was observed regardless of the extent of the fusion surface area of the Odontoid to Atlas. 70% of the geriatric Type 2 Odontoid fractures due to mechanical fall had no associated calcification of the ligament of Atlas.

Conclusion: We speculate, the fusion of Odontoid with Atlas appear to play a significant role in the Type 2 Odontoid fracture; possibly creating a single unit of Cranium,C1 and the fused Odontoid in the elderly, thereby predisposing the already fragile neck of Odontoid to fractures. Interestingly even fusion over a minor area appeared to be enough to render the structures vulnerable. Conversely the calcification of ligament of Atlas does not appear to play a significant role. Plausibly the anatomical role of Ligament is rendered inconsequential to the biomechanics of cervical motion at this joint following fusion and hence fixation of the above structures in geriatric population.

11.40 **C5 Palsy After ACDF: Topographical Correlation with Chassaigne's Tubercle (C6)? A Fresh Cadaveric Study** – Ali Rajabian, Glasgow

Author: Ali Rajabian, NA Quraishi

Institution: Nottingham Centre for Spine Research and Surgery, Queen's Medical Centre, Nottingham University Hospitals

Background context: C5 palsy post ACDF has been reported to be up to 8%, the exact cause of which is still a topic of ongoing debate.

Introduction/Aim: We hypothesised that etiologic mechanisms proposed thus far in the current literature although may have some plausible explanation, however they still cannot explain why C5 and not any other adjacent level suffer a post-operative palsy. Our aim was to explore the possible topographic correlation of C5 nerve root with regards to its course and regional relation to C6 tubercle.

Materials and Methods: Fresh cadaver had extensive layer by layer dissection performed by 2 surgeons (one of whom has extensive experience as an anatomy demonstrator and dissector). Roots of Brachial plexus were exposed in relationship cervical transverse processes. Photographs were taken at each stage of the exposure.

Results: We observed a close relation of path of C5 root with the C6 tubercle bilaterally, moreover we noted a sharper descent of C5 in comparison with the other adjacent roots.

Discussion: Sharper angle of C5 nerve root, variations in intra-operative neck position and shoulder pull may play a role in predisposing the nerve root to neuropraxia against this most prominent lateral cervical bony element.

Conclusion: We speculate that C5 nerve palsy may be related to the close association of the C5 nerve with Chassaigne's tubercle (C6). We would suggest a closer analysis of the C5 nerve in this region using finite element analysis with emphasis on the close proximity of the nerve and changes due to cervical motion.

11.50 **Epidemiology of Surgically-Treated Paediatric Spinal Deformity** – Simon Roberts, Edinburgh

Authors: S.B. Roberts, E. Bhatti, A.I. Tsirikos

Institution: Scottish National Spine Deformity Centre (SNSDC), Royal Hospital for Sick Children, Edinburgh.

Conflicts of Interest: None. **Funding source:** None

Background: Limited evidence exists regarding the epidemiology of different aetiologies of spinal deformity in the UK or other Caucasian populations.

Aim/purpose: To determine the epidemiology of surgically-treated paediatric spinal deformity in reference to the general population.

Study design/setting: Epidemiological study of prospective dataset.

Patient sample: Clinical data was prospectively collected for all patients aged 0-18 years that underwent surgery for spinal deformity in our National Centre between 2005-2014.

Outcome measures: Requirement for surgical intervention for spinal deformity

Methods: Clinical data of all paediatric and adolescent patients treated surgically for spinal deformity at SNSDC between 2005-2014 were compared with national population data for persons aged 0-18 years. The mean annual population incidences of severe spinal deformity between 2005-2009 and 2010-2014 were compared.

Results: The national prevalence was determined for spinal deformity of aetiologies as follows: infantile idiopathic scoliosis 0.12%, juvenile idiopathic scoliosis 0.02%, adolescent idiopathic scoliosis (AIS) 0.15%, congenital scoliosis 0.033%, neuromuscular scoliosis 0.026%, syndromic scoliosis 0.025%, Scheuermann's kyphosis 0.007%, spondylolisthesis 0.006%, scoliosis with intraspinal anomalies 0.003%, and scoliosis with congenital cardiac anomalies 0.001%. The overall incidence of surgically-treated paediatric spinal deformity increased from 0.016% to 0.023% across the study period ($p=0.02$). There was also an increase in the annual incidence of surgically-treated AIS (0.009% to 0.018%; $p=0.007$), spondylolisthesis ($p=0.03$), and scoliosis with intraspinal anomalies ($p=0.03$).

Conclusions: The overall prevalence of paediatric spinal deformity requiring surgical treatment is 0.2%, idiopathic scoliosis being most common. This information can be used to plan spinal deformity services, research strategies, and evaluate population screening.

12.00 **Scottish Back Pain Referral Guideline Audit – Khaled Badran, Dundee**

Authors: Mr Khaled Badran, Mr David Mowle and Mr Eric Ballantyne

Institution: Neurosurgery department, Ninewells hospital, Dundee, NHS Tayside

Conflicts of Interest: na. Funding source: self-funding

Background context: Back pain is leading cause of disability and it has significant impact on the health service. In light of the over whelming referral from GP for spinal surgery we want to assess how appropriate is the GP referral according the spinal pathway.

Aim / Purpose: Compliant of GP referral with the Scottish Back Pain Referral Guideline

Study design / Setting: Retrospective study from RMS referral and prospective study in OPD clinics

Patient Sample: 298 out of 600 RMS ref and 159 from OPD clinic

Outcome Measures: GP referral compliance against the national Scottish Back Pain Referral Guideline form.

Methods: All RMS GP referral for back pain over 6 months was selected and individually assessed and examined against the Scottish Back Pain Referral Guideline.

Results: Out of 298 RMS ref, 252 patient were seen in clinic, most of the referral was new or chronic onset back pain with new leg pain. 39% had been seen by physiotherapy. 67 patient symptoms had improved. 197 patients underwent surgery. Prospective study in clinics shown just under half of the patients referred has not been seen by physiotherapy. Only 36 % of the RMS referral is compliance to the Scottish Back Pain Referral Guideline

Conclusions: Majority of the RMS ref for spinal surgery are not complaint with the Scottish spinal pathway. We are trying adding physiotherapy in the clinical details section on the RMS ref and to ask GP whether full conservative measures have been taken before referral.

12.10 **Observations on the Natural History of Non-operative Management of Odontoid Process**

Fractures in the Elderly – Hamza Soleiman, Edinburgh

Authors: H A Soleiman, H. Shekhar, A K Demetriades.

Institution: Western General Hospital, Edinburgh.

conflict of interest and funding: None.

Introduction/Aim: Management of odontoid fractures in the elderly remains controversial and the use of cervical collars has variable success. We aimed at studying the outcomes of non-operative management.

Materials and Methods:

Design: Retrospective observational study.

Study design / Patient sample: patients with a C2 odontoid process fracture seen in the cervical spine fracture clinic over a 3 year period (January 2013- January 2016). Inclusion criteria: age >70 years. Exclusion criteria: initial surgical management; non-compliance with collar; incomplete follow up. Case-notes and radiology reviewed with patient demographics, clinical status and fracture characteristics.

Outcomes assessed: osseous fusion, stable non-union and unstable non-union rates.

Results: 45 patients fulfilled inclusion criteria. Male:female ratio 12:33. Mean age 83 years (range 70-94). Classification: 1 type I, 30 type II and 14 type III fractures (Anderson and D'Alonzo classification). The overall osseous fusion rate achieved at an average of 6 months c-spine immobilisation was 33% (15/45). Mean age was 80 years. The bony fusion rates were: 0% (0/1) for type I; 13% (4/30) for type II; and 79% (11/14) for type III. Non-union rate was 66% (30/45), but over half of this group (16/30) had no abnormal movement at the fracture site on dynamic x-rays at an average of 7 months, this group of stable non-union represents 36% of the whole cohort. The remaining patients, ie those without bony fusion or stable non-union (14/45, 31% of cohort), were offered lifelong collar immobilisation due to comorbidities and patient choice. The average age of patients with lifelong collar was 85 years. 9 patients experienced occipital neuralgia and neck pain but these symptoms resolved with strict hard collar use. 2 patients died during the observation period due to unrelated causes.

Discussion: The patients with unstable non-union tend to be older (average age 85) and have significant comorbidities. Their management is guided by patient preference and is challenging. Collar non-compliance rate was 19%.

Conclusion: In the elderly, conservative management of the odontoid process fracture is a practical option. The majority of patients have a good clinical outcome, with 33% osseous union and 36% stable non-union. In unstable non-union (31% of cohort), the question remains whether a lifelong collar is appropriate or if the benefits of surgical intervention outweigh the risks.

12.20 **Spinal Subependymomas: A Systematic review** - Hamza Soleiman, Edinburgh

Authors: H A Soleiman, H. Shekhar, A K Demetriades.

Institution: Western General Hospital, Edinburgh.

conflict of interest and funding: None.

Objective: Report the results of a systematic literature review on perioperative management and surgical outcome of spinal subependymoma and present an illustrative case of cervical spinal subependymoma.

Design: Systematic Review.

Methods: Ovid Medline and Embase databases were searched without language or date restrictions using the words; subependymoma and (spinal or cervical or thoracic). The articles were reviewed for reported spinal subependymoma cases radiological and pathological findings, surgical management and treatment outcomes. An illustrative case treated in our hospital is also discussed.

Results: 72 spinal subependymoma cases have been reported; 2 cervico-medullary, 24 cervical, 24 cervicothoracic, 10 thoracic, 10 thoracolumbar, and 1 each in the conus and the filum, the average symptoms duration at presentation is 52 months.

47 patients (65%) had total resection (including a 2 stage procedure). SSEP/MEP monitoring was reported in 15 cases (20%); only eight (11%) described monitoring results, five showing worsening potentials during surgery, and three reporting no change. Our case had initial global improvement with debulking, followed by reduction in non-dominant hand abductor pollicis brevis potential prior to stopping. The location within the cord was reported in 67 cases and was intramedullary eccentric in 40, intramedullary in 24, extramedullary with small attachment to cord in 2, and in the filum in 1 case, extension of the tumour to cord surface was reported in 43 cases where it did reach the cord surface in 21 and did not reach the surface in 22.

Post operative condition was not reported in 9 cases, worsened in 40 (63%), the same in 14 (22%), and improved in 5 (8%). Our case had transient hand weakness, which improved on post-operative follow up.

Conclusion: The reviewed cases report a rate of 65% total resection but 63% worsening in function after surgery. There were no reports of malignant transformation, therefore, long term survival is expected and surgical caution should be exercised where there is minimal symptom progression.

12.30 Title: Radiation Exposure to the Patient During Pedicle Screw Insertion - A Single Unit's Experience.

Authors: GA Augustithis, G Keane, AJ Bowey, MJ Gibson

Institution: Department of Spinal Surgery, Royal Victoria Infirmary, Newcastle

Conflicts of Interest: None

Funding source: None

(for the next 8 sections the word count should be under 250 words)

Background context: There is a well recognised radiation burden associated with spinal surgery. Recent data from a British scoliosis centre suggests only a minority of this exposure occurs intra-operatively. Despite this, and because the effects of radiation exposure are cumulative over a lifetime, it behooves spinal surgeons to safely minimise intra-operative radiation exposure to patients, especially in the young. This becomes particularly relevant as we start to consider more radiation intense forms of surgery such as percutaneous pedicle screw insertion and computer navigated spinal surgery.

Aim / Purpose: To examine intraoperative radiation exposure from a single unit and provide comparisons between open and percutaneous techniques as well as values for paediatric spinal deformity surgery to be used as a reference for future practice.

Study design / Setting: Mixed retrospective and prospective analysis of patients undergoing spinal instrumentation.

Patient Sample: 114 adult & 40 paediatric patients

Outcome Measures: Dose per patient in millisievert (mSv)

Methods: Data was collected on two cohorts of patients (both adult and paediatric). Patient demographics data was collected along with the type of surgery, number of pedicle screws inserted and total intraoperative radiation exposure in centi-Grays per centimeter squared (cGycm²). This was then converted to mSv to better represent the likely health effect.

Results: The mean radiation exposure for all adult cases was 0.56mSv (SD 0.83) and for paediatric cases 0.19mSv (SD 0.13). Percutaneous cases used 2.8mSv (SD 1.7) while Freehand used 0.39mSv (SD 0.39).

Conclusions: This data can be used by individual surgeons to benchmark their own intraoperative radiation exposure. While the radiation associated health risk posed by each procedure is small surgeons still must take this into account as part of a patients overall care.

12.40 Patient Reported Outcome Following Non-surgical Management of Type II Odontoid Process Fractures in Adults.

Nasir Rafiq

Background: Transverse (Type II) odontoid process fracture is among the most commonly encountered cervical spine fractures. Non-surgical management through external immobilization is occasionally preferred to surgical management. External immobilization is however criticized for its higher rates of failure and lower patient satisfaction. The aim of this study is to analyze patient-reported outcomes in patients who underwent non-surgical treatment for type II fracture odontoid process.

Methods: We searched medical records for patients aged 16 – 80 years of age who underwent external immobilization as a treatment for isolated type II odontoid process fracture between May 2007 – April 2012. We collected demographic parameters (age, gender), medical history, clinical presentation, mode of injury, mechanism of injury, follow-up imaging studies and concomitant radiology reports (cervical spine MRI, CT or X-ray). We also collected modality and duration of treatment rendered (soft collar, Halo-vest or both) through the first year after diagnosis. Patients were then contacted via telephone and asked to participate in a 15 minute telephone-based survey addressing all aspects of their recovery including their subjective rate of return to pre-injury level of functioning/activity throughout the first year of treatment.

Results: Fifteen patients met the inclusion/exclusion criteria and participated in our survey. Patients were follow-up for an average of 19 months after injury (ranging 16-27). Overall mean age was 61 years (32 – 80) and six (40%) of the patients were males. Injury followed a mechanical fall or a road traffic accident in 11 (73%) and 4 (27%) cases respectively. External immobilization was achieved by halo vest only in nine patients (60%), soft collar only in two patients (13%) and through a sequential combination in the remaining four patients (27%). External immobilization was deployed for a mean of 7.8 months (ranging 6-11). Radiological studies at the last follow-up showed bony healing (27%, n=4), fibrous non-union (60%, n=9) and persistent instability (13%, n=2). Reported complications were pin-site infection (33%) and pressure sores/ulceration (47%). Patients reported gradual recovery of function throughout the first year after injury with levels above 70% of pre-injury functioning achieved by 2 (13%) patients at six months, 5 (33%) patients at nine months and 7 (47%) patients at 12 months. Overall satisfaction with non-surgical management was 68% ranging 4 – 10 out of 10.

Conclusion: In selected patients, external immobilization represents a good option for treatment in type II odontoid process fracture with acceptable course of recovery.

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