

## **Practice Guidelines**

The AANS/CNS Joint Section on Disorders of the Spine and Peripheral Nerves, under the direction of Dr. Mark Hadley and Dr. Beverly Walters, has completed an evidence-based review of literature pertaining to the treatment of cervical spine trauma and spinal cord injury. This work represents a monumental effort of many prominent experts in spinal surgery and embraces twenty-two clinical questions ranging from immobilization in the field, to the role of Methylprednisolone after acute spinal cord injury. The evidence took two years to compile and analyze.

The end result, **Practice Guidelines in the Treatment of Cervical Spine and Spinal Cord Injury**, was published under separate cover as a supplement to the March 2002 issue of the journal *Neurosurgery*. This publication has become the reference manual for all clinicians involved in treating cervical spine injuries from the paramedics in the field, to the rehabilitation specialists involved in long-term follow-up.

We are continuing to publish a synopsis of each of the recommendations in this and subsequent editions of Neurosurgery News. The following is an excerpt from Chapter 4 of 22. This chapter is notable in that there exists excellent Class I evidence that provides a set of intuitive and reliable rules to answer the age old dilemma of “to image or not to image”. Here is a **PRACTICE STANDARD** that we should all make part of our personal decision trees.

## **RADIOGRAPHIC ASSESSMENT OF THE CERVICAL SPINE IN ASYMPTOMATIC TRAUMA PATIENTS**

### **RECOMMENDATIONS**

Standards: Radiographic assessment of the cervical spine is not recommended in trauma patients who are awake, alert, and not intoxicated, who are without neck pain or tenderness, and who do not have significant associated injuries that detract from their general evaluation.

Guidelines: None

Options: None

### **RATIONALE:**

Spinal cord injury is a potentially devastating consequence of acute trauma and can occur with improper immobilization of an unstable cervical spine fracture. Immobilization of an injury victim's cervical spine following trauma is now standard care in the vast majority of Emergency Medical Services (EMS) systems. Immobilization of the cervical spine is maintained until spinal cord or spinal column injury is ruled out by clinical assessment and/or radiographic survey. Radiographic study of the cervical spine of every trauma patient is costly and results in significant radiation exposure to a large number of patients, very few of whom will have a spinal

column injury. The purpose of this review is to define which radiographic studies are necessary in the assessment of the cervical spine in asymptomatic patients following trauma.

### **SUMMARY:**

Clinical investigations which provide Class I evidence involving nearly 40,000 patients, plus Class II and III evidence studies involving over 5000 patients, convincingly demonstrate that asymptomatic patients do not require radiographic assessment of the cervical spine following trauma. The combined negative predictive value of cervical spine x-ray assessment of “asymptomatic” patients for a significant cervical spine injury is virtually 100%.(2,4-6,9,14,16-18)

In contrast, the reported incidence of cervical spine injuries in the symptomatic patient ranged from 1.9% to 6.2% in these Class I evidence studies. Symptomatic patients require radiographic study to rule out the presence of a traumatic cervical spinal injury prior to the discontinuation of cervical spine immobilization.(2,4-6,9,14,16-18) The type and extent of radiographic assessment of symptomatic patients following trauma is the topic of a separate review.

### **KEY ISSUES FOR FUTURE INVESTIGATION**

None.

### **EVIDENTIARY TABLES**

<b>First Author Reference</b>	<b>Description of Study</b>	<b>Data Class</b>	<b>Conclusions</b>
Hoffman <i>New England Journal of Medicine</i> 343:94-99, 2000	Prospective study of 34,069 patients 4309 asymptomatic 2 had “clinically significant injuries” All patients radiographed Negative predictive value of 99.9% Positive predictive value 1.9% Note: One of two “missed injuries” did not really have a “significant injury,” as he was untreated and had no sequela with clinical follow-up. The other patient developed paresthesias in his arm and was found to have a laminar fracture of C6.	Class I	Radiographs not necessary in asymptomatic patients

Gonzales et al, <i>Journal of the American College of Surgeons</i> 189: 152-157, 1999	2176 patients prospectively studied with screening examination and radiographs. One injury was detected by plain films in an otherwise asymptomatic patient, however plain films missed 13 injuries overall.	Class I	Plain film radiography does not improve sensitivity (compared to the physical examination) for the detection of cervical spine injury in asymptomatic patients.
Roth, <i>Arch Surg</i> 129: 643-645, 1994	Prospective study of 682 patients admitted to ED with trauma 96 were asymptomatic, none had injury Overall incidence of injury was 2% All patients radiographed Follow-up clinical visit between 30-150 days post injury, achieved in 43% Negative predictive value of asymptomatic exam: 100% Positive predictive value of symptomatic exam: 2.7%	Class I	Radiographs likely not necessary in asymptomatic patients
Lindsey <i>Southern Medical Journal</i> 86:1253-1375, 1993	1,686 patients studied retrospectively, 597 patients studied prospectively A total of 49 patients with cervical spine injuries were identified (overall incidence 2.1%) No patient with an injury was asymptomatic	Class III The total number of symptomatic and asymptomatic patients are not reported, precluding the calculation of negative or positive predictive values.	Asymptomatic patients do not require radiographic images

Hoffman <i>Ann Emerg Med</i> 21: 1454-1460, 1992	974 blunt trauma patients prospectively studied Overall Incidence of cervical spine injury was 2.8% Of 353 alert, asymptomatic patients, none had a significant spine injury Follow-up: Radiographs negative in all 353 Charts, quality assurance logs, and risk management records reviewed with three month follow-up Negative predictive value of asymptomatic exam: 100% Positive predictive value of symptomatic exam: 4.5%	Class I	Asymptomatic patients do not require cervical spine films
Ross <i>British Journal of Accident Surgery</i> 23: 317-319, 1992	Prospective study of 410 patients seen at trauma center 196 patients had asymptomatic examination, none had injury All patients studied with plain films, CT's used as necessary Negative predictive value: 100% Positive predictive value: 6.1%	Class I	Radiography not mandatory for asymptomatic patients Main point of paper was that mechanism of injury is not a valuable predictor of injury.
McNamara: <i>Journal of Emergency Medicine</i> 8:177-182, 1990	Retrospective review of 286 patients judged to be "high risk" by mechanism of injury 178 were asymptomatic, none had cervical spine injury 108 were symptomatic, 5 had cervical spine injury Chart follow-up performed to determine incidence of injury Negative predictive value for asymptomatic exam was 100% Positive predictive value for symptomatic exam was 4.9%	Class III Many patients excluded due to poor documentation, select population follow-up inadequate (films not done on everyone, no delayed chart review)	Cervical spine radiographs not necessary in asymptomatic patients

<p>Bayless <i>Am J Emer Med</i> 7:139-142, 1989</p>	<p>Series of 228 patients, 211 with complete studies Overall incidence of significant spinal injury was 1.7% Of 122 alert, asymptomatic patients, none had a significant injury Follow-up: Radiographs negative in all 122 Charts reviewed for Any subsequent referable visits within 2 years Negative predictive value of asymptomatic Exam: 100% Positive predictive value of symptomatic examination: 3%</p>	<p>Class I</p>	<p>Asymptomatic patients do not require cervical spine films</p>
<p>Kreipke <i>Journal of Trauma</i> 29:1438-1439, 1989.</p>	<p>Prospective study of 860 patients presenting to trauma center 324 asymptomatic, none had injury All patients radiographed Negative predictive value of asymptomatic exam: 100% Positive predictive value of symptomatic exam: 4%</p>	<p>Class I</p>	<p>Radiographs not necessary in asymptomatic patients</p>

<p>Mirvis <i>Radiology</i> 170: 831-834, 1989</p>	<p>408 patients studied with standard radiographs and CT Total population seen was 4135 patients 241 patients underwent CT because of “suspicious” radiographs, failure to visualize extremes of C-spine, or for confirmation of known fracture. Of these 241, 138 patients were clinically asymptomatic CT served as “gold standard” None of these 138 patients had a clinically relevant injury (although one had a nondisplaced C7 transverse process fracture which was treated with a collar). Negative predictive value of asymptomatic exam 99.3-100% Positive predictive value of symptomatic exam 12.6%</p>	<p>Class II, select population gold standard may be false endpoint</p>	<p>Clinically relevant cervical spine injury is extremely uncommon in asymptomatic patients. Radiographs may be unnecessary.</p>
<p>Neifeld <i>Journal of Emergency Medicine</i> 6:203-207, 1988</p>	<p>Prospective study of 886 patients 244 asymptomatic patients, none had injury All patients radiographed Negative predictive value 100% Positive predictive value: 6.2%</p>	<p>Class I</p>	<p>Asymptomatic patients do not require radiographs.</p>
<p>Roberge <i>Journal of Trauma</i> 28: 784-788, 1988.</p>	<p>Prospective study involving 467 trauma patients 155 asymptomatic patients were asymptomatic, none had a spine injury 312 were symptomatic, 8 had spine injuries All patients “scheduled to follow-up” in surgery clinic, authors state that no missed injuries have been identified Negative predictive value of asymptomatic exam: 100% Positive predictive value of symptomatic exam: 2.5%</p>	<p>Class I</p>	<p>Asymptomatic patients do not require radiographs</p>

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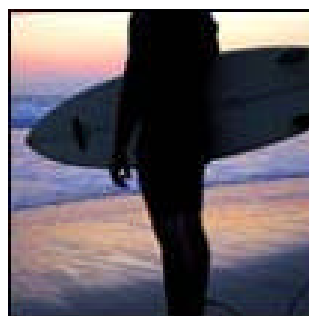
Bachulis et al. <i>American Journal of Surgery</i> 153:473-478, 1987	1823 of 4941 trauma patients studied with plain radiographs. 94 patients found to have injuries. All were symptomatic. No asymptomatic patient had a radiographically detectable injury.	Class III	Asymptomatic patients do not require radiographs.
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First Author Reference	Description of Study	Data Class	Conclusions
Tator et al, 1993, <i>Surg Neurology</i>	A study of 201 ASCI patients, ICU care, hemodynamic support compared to 351 prior patients	Class III	Less severe cord injuries due to immobilization, resuscitation and early transfer to ICU setting.
Armitage et al, 1990, <i>BMJ</i>	Case reports of four patients who developed respiratory problems during airplane transport.	Class III	Airplane air is less humid and measures to optimize humidity and pulmonary function travel in high cervical injury patients may be required
Boyd et al, 1989 <i>J Trauma-Injury Infection &amp; Crit Care</i>	A prospective cohort study to determine the effectiveness of air transport for major trauma patients when transferred to a trauma center from a rural emergency room.	Class III	Patients with severe multiple injury from rural areas fare better with helicopter EMS than ground EMS
Burney et al, 1989 <i>J Trauma-Injury Infection &amp; Crit Care</i>	Retrospective review of the means of transport and type of stabilization used for all patients with ASCI.	Class III	Acute SCI patients can be safely transported by air or ground using standard precautions. Distance and extent of associated injury are the best determinants of mode of transport.
Tator et al, 1984 <i>Can J of Surg</i>	A retrospective review of results of innovations between 1974 to 1979 at Sunnybrook Medical Centre in Toronto.	Class III	Patients transferred to the SCI unit earlier, with consequent marked reduction in complications and cost of care.
Hachen, 1977 <i>J Trauma</i>	A study of 188 ASCI managed in centre ICU, aggressive treatment of hypotension, respiratory insufficiency	Class III	Reduced morbidity and mortality with early transfer, attentive ICU care and monitoring, and aggressive treatment of hypotension and respiratory failure.
Zach, et al, 1976 <i>Paraplegia</i>	A study of 117 ASCI at Swiss Center, ICU setting aggressive BP, volume therapy. Rheomacrodex x 5d Dexamethasone x 10d	Class III	Improved neurological outcome with aggressive medical treatment. Better outcome for early referrals.
Hachen, 1974 <i>Paraplegia</i>	Retrospective review of effectiveness of emergency transportation of spinal injury patients in Switzerland. Between 1965-1974 all SCI patients were immediately transported by air to SCI center. Mortality reduced to zero, during transport. Average time for the rescue operation reduced from 4.5 hours to 50 minutes. h Significant reduction in cardiovascular and respiratory morbidity.	Class III	Mortality and morbidity of patients with acute spinal injury is reduced by a well-organized medical response with smooth and rapid transfer by helicopter to a specialized SCI center.



## **ANNUAL MEETING – SAN DIEGO, CALIFORNIA**

The AANS/CNS Section on Disorders of the Spine and Peripheral Nerves will hold its 20<sup>th</sup> annual meeting in San Diego, California at the beautiful Marriott Hotel and Marina from March 17-20. Make your reservations now!



## **AWARDS**

**RESEARCH FUNDING:** The AANS/CNS Joint Section on Disorders of the Spine and Peripheral Nerves has established three Research Grants: the ***Larson Research Award***, the ***Kline Research Award***, and the ***Afelbaum Research Award***. They are intended to establish funding for clinical projects related to the spine and peripheral nerves, and to provide a means of peer review for clinical research projects to help improve the quality of the proposal and therefore, enhance competitiveness for National Institutes of Health (NIH) funding. The awards are also meant to create an annual funding mechanism to establish the AANS/CNS Spine Section as a known source for quality clinical research aimed at answering questions pertaining to the treatment of disorders of the spine and peripheral nerves. Depending upon the quality of the award submissions, there may be one award in each category annually.

The ***Larson Research Award*** sponsored by DePuy/Acromed is limited to clinical research and provides for funding of up to \$30,000. The ***Afelbaum Research Award*** provided by Aesculap is directed towards basic science or clinical research related to the spine for amounts up to \$15,000. The ***Kline Research Award*** donated by Integra is for either basic science or clinical research related to the peripheral nervous system, also up to \$15,000. All awards are intended to be applied as start-up funds for research requiring national level funding, to support preparation of grant proposals and external consultations, and to otherwise assist in the development of the proposal, planning meetings, and the collection of pilot data. Work that can be completed without such support (such as a literature review and preliminary protocol design) should be completed before applying for these awards.

The format of the proposal should follow that of the NIH grant package. Specifically, applications should not exceed five single-spaced pages. The applicants should address their specific aims, pertinent literature review and previous studies, include a brief summary of the proposed study, and a plan for utilization of the funds, as well as a detailed budget and budget

justification. The budget should not include salary support for the primary investigator or co-investigators.

Application details for research grants are available from James D. Guest M.D., Ph.D., James D. Guest MD, PhD, FRCS(C), Department of Neurological Surgery, Lois Pope LIFE Center, 1095 NW 14th Terrace (D4-6) Miami, FL, 33136, phone (305) 575-7059, or check out our website at [www.neurosurgery.org](http://www.neurosurgery.org). The application deadline for grants to be awarded for 2003 is Dec. 1, 2003.

**FELLOWSHIP FUNDING:** The *Cloward Fellowship Award* sponsored by Medtronic Sofamor Danek and the *Cahill Fellowship Award* sponsored by Synthes are provided annually to U.S. or Canadian trained neurosurgical residents to provide supplemental funds for advanced education and research in disorders of the spine or peripheral nerves in the form of fellowship training away from their parent institution. The amount of each award is \$30,000. Applicants should be residents in training, American Board of Neurological Surgery eligible fellows, or Royal College of Physicians and Surgeons post-graduate fellows, and must provide a letter of acceptance from the designated mentor and program, a letter of support from their training program director, a description of the proposed fellowship summarizing the education or research goals, and a current CV.

The *Sonntag International Fellowship* sponsored by Medtronic Sofamor Danek and the *Crockard International Fellowship* sponsored by DePuy/Acromed are awarded annually to a neurosurgical resident or neurosurgeon from outside of the U.S. or Canada to provide supplemental funding for advanced education and research in disorders of the spine in the form of a fellowship experience in the United States or Canada. The amount of each award is \$5000. Applicants must provide a letter of acceptance from the designated mentor and program, a letter of support from their training program director if applicable, a description of the proposed fellowship summarizing the educational or research goals, and a current CV.

Application information for the Cloward Fellowship Award can be acquired from Mitch R. Groper M.D., 2515 North Clark St., Ste 800, Chicago, Illinois 60414-2720, phone (773) 388-7700, or check out our website at [www.neurosurgery.org](http://www.neurosurgery.org)

The application deadline for the 2004 Fellowship Awards is December 1, 2003.

**RESIDENT AWARDS:** The Mayfield Award is presented annually by the Joint Section on Disorders of the Spine and Peripheral Nerves to the neurosurgical resident who authors an outstanding research manuscript detailing a laboratory or clinical investigation in the area of spinal or peripheral nerve disorders. Two awards are available, one for clinical research and one for basic science research. Each recipient will receive a \$1000 cash award and an honorarium up to \$2000 to cover annual meeting Joint Spine Section meeting expenses. Abstracts to be considered for the Mayfield Award should be identified as such on the annual meeting abstract submission form and submitted prior to the abstract deadline. Finalists will be asked to submit the complete manuscript to the Awards Committee by December 1 of the application year.

For further information and submission forms, please contact Mitch Groper, or check out our website at [www.neurosurgery.org](http://www.neurosurgery.org)

## **DEADLINES**

- December 1, 2003: Larson, Afelbaum, and Kline Research Awards
- December 1, 2003: Cloward, Sonntag, and Crockard Fellowship Awards
- September 24, 2004: Mayfield Awards

## **CODING CORNER – Gregory J. Przybylski, MD**

(reprinted by request from Nov 2002)

### **MINIMALLY-INVASIVE SPINE SURGERY CODING**

We have seen substantial attention at our annual and regional meetings given toward minimally-invasive spinal surgery techniques. While the potential benefits of reduced perioperative morbidity are commonly accepted, a frequent question arises concerning the physician coding of these new procedures. This coding corner addresses the current concepts and future options regarding codes for minimally-invasive spinal surgery.

Although the use of CPT (current procedural terminology) codes for describing physician services has been a part of practice for several decades, the codes are revised annually as new technology evolves. However, some common procedures are incompletely described by current codes. Whereas a physician may choose the code best describing the service provided, there has been an increasing effort at the American Medical Association (AMA) to make the descriptions more specific as part of the CPT-5 project. Moreover, the Centers for Medicare and Medicaid Services (CMS, formerly HCFA) are demanding use of existing codes only if the procedure performed is exactly the same as the service descriptor in the code.

Consequently, the nearly all of the current codes for decompression as well as arthrodesis and instrumentation describe open rather than endoscopic or minimally-invasive techniques. The only recent exception was the revision of 63030 (lumbar hemilaminotomy for discectomy),

which was revised at CPT to include an open or endoscopic technique. Otherwise, other percutaneous procedures that only currently have open procedure counterparts must be coded with an unlisted code such as 22899 or 64999. The reimbursement implications of using unlisted codes include manual review, requirement of documentation, and a likelihood of payment denial.

The AANS/CNS Coding and Reimbursement Committee, the Joint Section Coding Committee, and the North American Spine Society Operative Coding Committee are all currently discussing this issue to evaluate various options. Given the recommendation of the AMA and the insistence of CMS that open codes should not be used for percutaneous or endoscopic procedures, alternatives to unlisted codes need to be explored. However, the issue is much more complicated than simply creating a new series of codes for these techniques.

One option would involve the development of an endoscopic-assistance add-on code similar to the microdissection code 69990 that would be used in conjunction with the open code. The AANS/CNS recently had such an add-on code approved by CPT for 2003 and valued by the Relative-value Update Committee (RUC) of the AMA for endoscopically-assisted placement of a ventricular catheter. A similar add-on code previously existed for endoscopic biliary surgery. However, this method only addresses the issue of endoscopic-assistance for open, or perhaps minimally-open, procedures, but not percutaneous procedures.

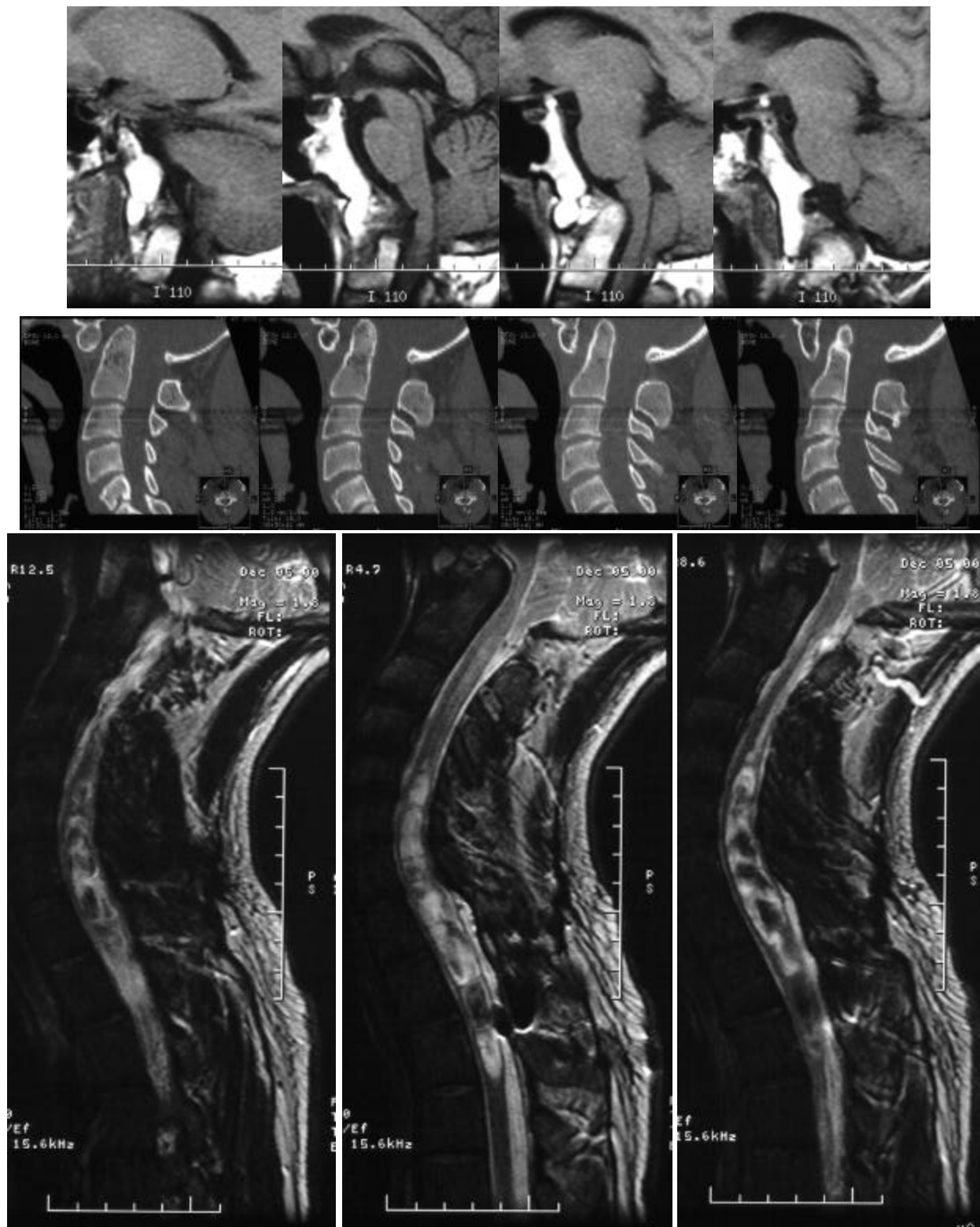
Alternatively, new codes can be developed for these techniques and valued on their own merit. However, CMS has held the position that minimally-invasive procedures require less physician work and therefore will be paid less by CMS in comparison to the open procedures. Likewise, the RUC desires a “significant burden of proof” to value a minimally-invasive procedure higher than an open procedure. The predominant driving force of valuing physician work is the time required to provide the service. This includes both surgical intraoperative time as well as postoperative follow-up care for the 90-day global period. Since a significant advantage of minimally-invasive procedures includes shorter hospital stays and diminished postoperative care, the estimated physician work is less than that of an open procedure.

Consequently, the coding committees of the various societies are carefully examining the available options as well as the future reimbursement implications of these approaches. In the interim, the recommendation for minimally-invasive procedures that do not already have a specific “non-open” code should be billed using an unlisted code, with the exception of endoscopically-assisted lumbar discectomy which can be coded 63030.

## **CONSULTANTS CORNER**

Case Presentation: This 29 year old right handed systems engineer developed pain and numbness in the left side of his chest, aggravated by coughing and sneezing eight years ago. Investigations at that time demonstrated a Chiari I malformation with cervical syringomyelia. A syringo-subarachnoid shunt was placed in the upper thoracic spine. He did well until 18 months prior to his most recent presentation when he began to notice symptom recurrence. In addition

the numbness had spread to involve both legs. Occipital headaches had become prominent, aggravated by coughing and sneezing.



Physical examination verified impaired light touch appreciation in both legs. Pinprick was diminished in the left hemithorax and abdomen. Muscle bulk and power were normal in all extremities. There were no spastic catches behind either knee or at the forearms. The deep tendon reflexes were a bit brisk in both legs (3/4) with two beats of unsustained clonus at each ankle. Fine motor movements of both hands were normal. Tandem gait and Romberg testing were also normal. Cranial nerves were normal.

Imaging studies demonstrated congenital fusion of the atlas to the clivus and upward migration of the odontoid with compression of the brainstem, tonsillar descent to the level of C2, and a large cervical syrinx.

*How would you manage this case?* Please send your comments to [jhurlber@ucalgary.ca](mailto:jhurlber@ucalgary.ca). In the next edition, we will provide input from a panel of experts as well as any other comments we receive from you.

### **AANS/CNS Joint Section on Disorders of the Spine and Peripheral Nerves – Executive Committee Elections**

In accordance with Joint Section Bylaws, the Nominating Committee has forwarded the names of the following individuals for positions on the executive committee:

President Elect: Robert Heary

Member at Large: Daniel Kim

### **Comments, Submissions, or Suggestions for the Spine Section?**

Please e-mail John Hurlbert at [jhurlber@ucalgary.ca](mailto:jhurlber@ucalgary.ca) or contact through surface mail: Dr. R.J. Hurlbert, University of Calgary Spine Program, Foothills Hospital and Medical Centre, 1403-29<sup>th</sup> St. N.W., Calgary, AB Canada T2N 2T9