ligament or ligamentum flavum was associated with worse outcomes at initial examination and at 1-year follow up. Lesion length was also significantly associated with outcomes at 1 year evaluation and initial evaluation. *Conclusions:* Early MRI has an important prognostic value in patients suffering SCIWORA. Lesion length is a powerful predictor of outcome. Soft tissue injury and spinal cord changes play a role in the severity of injury as well as the ability to recover.

F.02

Towards the complete control of brain metastases using surveillance screening and stereotactic radiosurgery

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Background: The incidence of brain metastases is increasing with the development of improved systemic therapies with limited impact on intracranial disease. The purpose of this study was to determine if there is a threshold tumor size below which local control (LC) rates approach 100% after stereotactic radiosurgery (SRS). *Methods:* 200 patients with 1237 tumors were identified from a prospective registry of patients having undergone SRS between 2012-2014. Histology consisted predominantly of non-small cell lung cancer (NSCLC), melanoma and breast cancer. *Results:* The median tumor size was 6mm in diameter or 70mm^3 and most commonly NSCLC. Thirty-three tumors had local progression at a median time of 8.8 months. The 1- and 2-year actuarial LC for all tumors were 97% and 93%. LC of 100% was seen for intracranial metastases less than 100mm^3 or 6mm in diameter, independent of histology. Total tumor volume was an independent predictor of overall survival, after adjusting for age, KPS and extracranial disease status. *Conclusions:* SRS can achieve LC rates approaching 100% for subcentimeter metastases. The earlier detection and prompt treatment of small intracranial metastases may prevent the development of neurological symptoms, the need for surgical resection, and potentially improve overall survival. The results of this study would favour the implementation of routine staging MRIs.

F.03

Timing of incidence and recovery of delayed facial palsy after vestibular schwannoma resection: insight into mechanisms

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Background: Delayed facial palsy (DFP) after resection of vestibular schwannomas (VS) is described as worsening of facial nerve function after a normal postoperative result. Several mechanisms have been postulated to explain this phenomenon, although none satisfactorily explain all of its features. Furthermore, systematic documentation of recovery rates is lacking. *Methods:* 403 consecutive cases of VS resection between 2001 and 2015 were reviewed. Patients with preoperative facial palsy were excluded. Patients developing significant facial palsy (HB grade $\geq$ 3) were categorized into groups based on timing of onset: immediate facial palsy (IFP), "early-onset" DFP (within 48h), and "late-onset" DFP (after 48h). IFP patients were subdivided into "minor" (HB grade 3) and "major" (HB grade$\geq$4) groups. These groups were compared with respect to demographics, intraoperative data, and recovery. *Results:* The late-onset DFP group demonstrated the quickest recovery to HB$\leq$2 (2.9 weeks), followed by the minor IFP group (8.5 weeks), then the early-onset DFP group (53 weeks). Major IFP group exhibited the poorest recovery with only 32% recovering to HB grade$\leq$2 within one year. *Conclusions:* The bimodal distribution in recovery time in delayed facial palsy patients implies separate underlying phenomena. We propose that a delayed demyelination of the facial nerve occurs in late-onset DFP, and best explains the uniformly rapid recovery observed.

F.04

Flow diversion in the treatment of aneurysms: A randomized care trial and registry

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Background: The Flow diversion in the treatment of Intracranial Aneurysm (FIAT) trial was designed to guide the clinical use of flow diversion. *Methods:* FIAT proposed randomized allocation flow diversion or standard management (observation, coiling, parent vessel occlusion, or clipping), and a registry of non-randomized patients treated with flow diversion. Primary safety outcome was death or dependency (mRS > 2) at 3 months. Primary efficacy outcome was angiographic occlusion at 3-12 months combined with independent clinical outcome. *Results:* Of 112 participating patients recruited, 78 were randomized, and 34 received flow diversion within the registry. The study was halted for safety concerns. Twelve of 73 patients (16.4%; CI [9.7% -26.7%]) who were allocated or received flow diversion at any time were dead (n=8) or dependent (n=4) at 3 months or more, crossing a predefined safety boundary. Death or dependency occurred in 5 of 36 patients randomly allocated flow diversion and in 5 of 36 patients allocated standard treatment (13.9%; [6.1%-28.7%]). Efficacy was below hypothesized expectations: 15 of 36 patients (41.7%; [27.1%-57.8%]) randomly allocated flow diversion failed to reach the primary outcome, as compared to 11 of 36 patients allocated standard treatment (30.1%; [18.0%-46.9%]). *Conclusions:* Flow diversion was not as safe and effective as hypothesized. More randomized trials are needed.

F.05

Characterization of NBCA glue polymerization for embolization of brain AVM's

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Background: Brain arteriovenous malformations (AVM's) are abnormal connections between arteries and veins. Endovascular glue embolization with N-butyl cyanoacrylate (NBCA) is an accepted form of treatment, with most complications related to timing of polymerization. Current literature reports a wide range of polymerization

times with large discrepancies between in-vivo and in-vitro results. *Methods:* Polymerization time was measured for mixtures of lipiodol/NBCA of 50/50, 60/40, 70/30. The influence of pH, temperature and presence of biological catalysts on polymerization rate was investigated in-vivo using submerged droplet tests. PVA-C, silicone and endothelium surfaces were compared and contact angles were measured to assess physical interaction with NBCA. High-speed video of glue injection through a microcatheter was captured to characterize coaxial flow. *Results:* Polymerization rate increases with pH and temperature. A hydrophilic substrate such as PVA-C provides surface properties that are most similar to endothelium. Endothelium provides a catalytic surface that increases the rate of polymerization. Blood products further increase the polymerization rate with RBC's providing almost instantaneous polymerization of NBCA upon contact. Characterization of coaxial flow shows dripping to jetting transition with significant wall effect. *Conclusions:* We have successfully deconstructed and characterized the dynamic behavior of NBCA embolization. A refined understanding of NBCA behavior could help reduce embolization-related complications.

F.06

Our institution's experience with in-patient falls on the Neurosurgery ward

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Background: Neurosurgery patients are at higher risk of falls given the morbidity associated with their neurological disease. We present our department's experience with in-patient falls. *Methods:* We analyzed our hospital's database for Neurosurgery in-patient falls from January 1st till December 31st, 2015. *Results:* Of 1,317 patients admitted under Neurosurgery, 5% (n= 63) had in-patient falls. CT head was done in 24% (n= 15) of patients who had a fall and 93% (n= 14) of the CT head post-fall was reported as no significant interval change. The combined cost of repeat CT imaging reporting no interval changes was approximately $ 7,000. One CT head post-fall showed worsening midline shift but did not impact management. One of the 78% (n= 48) post-fall patients who did not get a CT head progressed to coma requiring emergent surgery and another patient suffered an isolated hip fracture requiring operation. 41% (n= 26) of falls were from bed and 37% (n= 22) were while ambulating. Leading diagnosis of in-patient falls was subdural hematoma (33%, n = 21) and tumour (32%, n=20). *Conclusions:* Identification of risk factors for in-patient falls can reduce hospitalization costs. The highest number of in-patient falls occurs in patients with subdural hematoma and are likely to occur from a patient's bed.

F.07

Reducing ventricular shunt malfunction in the adult patient

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Background: Treatment of adult patients with hydrocephalus is often undertaken with a ventriculoperitoneal shunt (VPS). Failure rates have been reported as high as 50% in the first year. *Methods:* A Quality Improvement (QI) model was used to evaluate and modify VPS-insertion techniques to improve outcome. Malfunction was defined as a change in neurological shunt-related function with correlated diagnostic imaging studies. Prospectively collected data from 2012-2015 was reviewed. *Results:* 146 patients underwent a new VPS insertion. Diagnoses were: normal pressure hydrocephalus 101 patients, acquired hydrocephalus 28 patients and chronic-congenital hydrocephalus 17 patients. 103 patients had traditional insertion of a ventricular catheter using surface landmarks with 2 catheter misplacements requiring surgery. Image guidance with electromagnetic tracking was instituted with 0 catheter misplacements in 43 consecutive patients. 121 patients had traditional minilaparotomy/trocar placement of the peritoneal catheter with 59/121 (49%) experiencing shunt malfunction and 35/59 (59%) experiencing a second malfunction requiring surgery. Laparoscopic insertion of the peritoneal catheter was instituted in 25 consecutive patients with 3 (12%) distal obstructions. Laparoscopy was also used in 13 patients undergoing VPS revision with 2 (15%) experiencing subsequent malfunction. *Conclusions:* Changes to standard VPS surgical treatment including the addition of image-guidance and laparoscopic surgical techniques were associated with a significant decrease in shunt malfunction requiring surgery.

F.09

Neurosurgical Outcomes in patients with Multiple Sclerosis related Trigeminal Neuralgia

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Background: The aim of this study was to assess the outcomes of surgery for multiple sclerosis-related trigeminal neuralgia (MS-TN). *Methods:* All Manitobans undergoing first surgery for medically refractory MS-TN between 2000 and 2014 were identified. The time interval until additional surgeries were required for recurrent pain, defined as the time to fail (TTF), was determined from a retrospective chart review. Kaplan-Meier analyses were performed and outcomes compared. *Results:* Twenty-one patients (26 sides) underwent first rhizotomy by GammaKnife (GK, 13), glycerol injection (PGR, 10) or balloon compression (BCR, 3). Second procedures were required in 88% at 15±13 months, including GK (24), PGR (19), BCR (25), microvascular decompression (2) and open surgical partial rhizotomy (Dandy, 4) for an overall total of 99 surgeries (1-12 per side). The additional GK, PGR, and BCR eventually failed and required further surgeries in 40%, 60% and 70% at 1, 2, and 3 years respectively with a trend to longer TTF compared to first surgeries (ns). Follow up of Dandy procedures, however, identified no pain recurrence at 4 to 110 months. *Conclusions:* The minimally invasive rhizotomies for MS-TN were associated with high rates of recurrence and reoperation. Long term pain relief was best achieved with a Dandy procedure, even after multiple prior rhizotomies.