

postoperative complications and demographic, operative and biomarker variables. Receiver operating characteristics analysis and Youden's index were used to determine the prognostic accuracy and optimal cut-off values of the statistically significant variables for the prediction of postoperative complications. Results: 11 out of 88 patients had postoperative complications. Pneumonia and surgical site infection were the most common complications (4 patients each). The 'complication' group had a significantly higher NLR and lower lymphocyte percentage than the 'no complication' group. There were no other statistically significant variables. The optimal cut-off value of lymphocyte percentage was $\leq 29.5\%$ (sensitivity: 91%, specificity: 54.9%), with an area under the curve (AUC) value of 0.706 (95% CI: 0.535 - 0.877, $p=0.03$). The optimal cut-off value of NLR was ≥ 2.32 (sensitivity: 72.7%, specificity: 64.8%), with an AUC value of 0.693 (95% CI: 0.518 - 0.868, $p=0.04$).

Conclusion: A raised NLR and/or decreased lymphocyte percentage preoperatively could be associated with postoperative morbidity. Authors suggest that patients with preoperative lymphocyte percentage $\leq 29.5\%$ and/or NLR ≥ 2.32 should be closely monitored as a high risk group susceptible for postoperative complications. Further large scale prospective multicentre studies are needed to confirm our findings.

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QF93

BRAIN AND SPINE 1 (2021) S1–S124 100279 VIRTUAL REALITY TRAINING IN SPINE SURGERY: AN INNOVATIVE SOLUTION FOR INCLUSIVE AND VALUE-BASED COACHING

A.N.D.R.E.A. LUCA, Riccardo Giorgino, Emanuele Ruberto, Alessio Lovi, Lisa Babbi, Marco Brayda-Bruno. *Spine Unit III, IRCCS Galeazzi, Milan, Italy*

In recent years, the staggering increase of healthcare services complexity, coupled with new economic scenarios, has promoted a reorganization of the educational pathways with the purpose to optimize the acquisition of competence and its assessment, to reduce the risks to both healthcare professionals and end-users, thus saving on the associated costs.

Despite all the efforts, social factors, such as gender and socio-economic status, are reported to heavily interfere with the educational training in medicine and, more specifically, in surgical specialties.

Virtual Reality-based training program is routinely applied in other fields (civil aviation and military) and recently has been found to meet also the needs of medical sciences providing powerful tools to enhance and shorten the learning curve reducing the impact of the above mentioned social factors.

The aim of this study was to demonstrate the potentiality of VR simulation training in spine surgery.

The VR simulator reproduced the lateral lumbar access to the spine. The simulation included a tutorial, the preoperative settings, and the surgical session.

A total of 10 users, 5 males and 5 females, were recruited to test the simulation: each user completed the simulation twice. The users were orthopaedic residents and junior orthopaedic surgeons who had previously attended the proposed surgical procedure in OR without performing it as first operators.

At the end of the procedure, the simulator provided a qualitative and quantitative performance's evaluation.

On average, the entire simulation was completed in 26'52". All users showed an improvement between the two attempts in both sessions, the preoperative settings and the surgical simulation: the number of major errors dropped from an average of 6.4 to 1.5 (max 8 - min 1) and from an average of 5.2 (max 6 - min 1) to 1.4 respectively. The simulation was never interrupted because of technical bugs or adverse effects related to the technology.

No significant statistical differences were found in male and female groups.

In conclusion, the VR-based training in spine surgery holds promise to be of value for residents and inexperienced surgeons. It can provide a better understanding of the surgical technique since the very beginning of the procedure and may be repeated as many times as needed to increase the learning process. The possibility to easily and repeatedly access the training program without additional costs and to receive unbiased feedbacks represents a further step in the way of creating a value-based and inclusive educational process.



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BRAIN AND SPINE 1 (2021) S1–S124 100280 SPINAL INTRADURAL ARACHNOID CYSTS - A MULTICENTRE CASE SERIES ASSESSING MANAGEMENT AND OUTCOMES

James Bartram, Asfand Baig Mirza, Siddharth Sinha, Timothy Boardman, Axumawi Gebreyohanes, Amisha Vastani, Edward Dyson, Vittorio Russo, David Choi, Ahilan Kailaya-Vasan, Gordan Grahovac. *Department of Neurosurgery, Kings College Hospital, London, UK*

Objective: Spinal Intradural Arachnoid Cysts (SIACs) are a rare pathology that can arise via outpouchings of the arachnoid layer in the spinal cord resulting in neurological deficit. We present a clinical case series of SIACs presenting at two neurosurgical centres over 10 years.

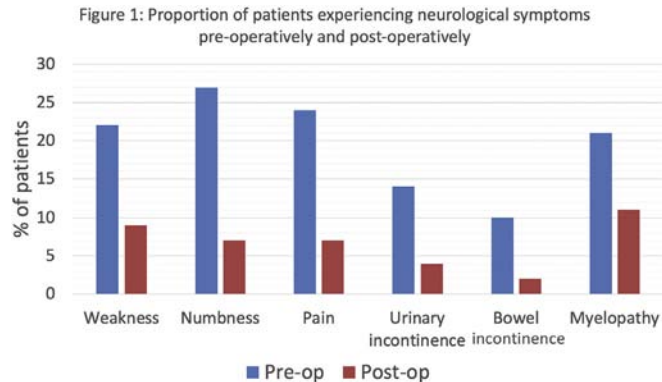
Methods: We performed a retrospective analysis (July 2009 - July 2020) of electronic patient records, patient demographics, clinical presentation, histopathology, clinical management including surgery and follow up data.

Subjects

42 patients with surgically managed spinal intradural arachnoid cysts.

Results: A total of 42 patients were surgically operated on at the units. In 30 patients the SIAC was located dorsally to the cord, with the remaining being ventral. A syrinx was present in 11 cases. Primary SIACs were seen in 27 cases, whilst the remaining 15 were secondary SIACs. The majority of cases presented electively, with nine requiring repeat operations. Procedures used for treatment of cysts included resection, fenestration and marsupialisation. Average length of stay was 11.9 days. No major intra-operative or post-operative complications occurred following any of the procedures. The mean follow-up time was 10 months. Follow up MRI showed no change in size of the cyst in 14 patients, 11 patients with complete resolution, 4 with a decrease in size and 2 with an increase in size. Overall, the proportion of patients experiencing neurological symptoms improved greatly post operatively, with the reduction of prevalence of limb weakness being 59.1%, numbness 74.1%, back pain 70.2%, urinary incontinence 71.4%, bowel incontinence 80.0% and myelopathy 47.6%. There was

little difference in outcomes between the cohorts treated with each procedure. **Conclusion:** SIACs are a rare pathology that arises in the spine - these cysts are variable in size and location extending over multiple vertebral levels and can be found in both ventral and dorsal locations. We demonstrate that high quality outcomes can be achieved using several surgical techniques.



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BRAIN AND SPINE 1 (2021) S1-S124 100281
INTRAOPERATIVE INDOCYANINE GREEN (ICG) VIDEOANGIOGRAPHY IN INTRAMEDULLARY HEMANGIOBLASTOMA SURGERY: HELPFUL TOOL OR UNNECESSARY?

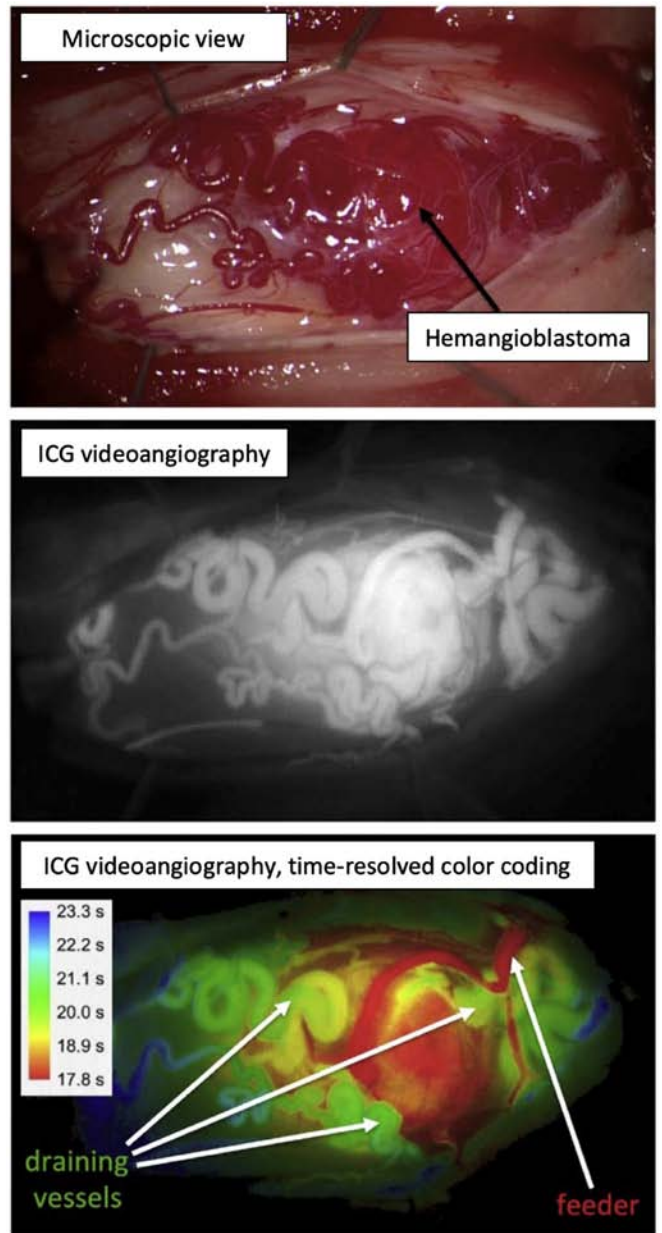
Jan-Helge Klingler, Christine Steiert, Bianca-Ioana Blaß, Romina Hohenhaus, Jürgen Grauvogel, Christian Scheiwe, Jürgen Beck. *Dept of Neurosurgery, Freiburg, Germany*

Objective: Hemangioblastomas are highly vascularized tumors and can cause an extensive architecture of surrounding pathological vessels. During microsurgical en-bloc tumor resection, it is crucial to first ligate tumor-feeding vessels. However, the distinction between these tumor-feeding vessels and draining veins is usually not obvious even under microscopic view. Indocyanine green (ICG) videoangiography is an intraoperative procedure that enables time-resolved fluorescence-based imaging of vessels (Figure 1). The aim of this investigation is to provide recommendations in which hemangioblastoma cases this technique might be beneficial for safe en-bloc tumor resection.

Methods: We reviewed all resected spinal hemangioblastomas over a period of 28 months (Aug 2018 - Nov 2020) in our VHL center to identify surgeries in which ICG angiography was used. Analyzing these cases, we qualitatively evaluated the benefit of intraoperative ICG angiography to identify possible tumor-feeding vessels and draining veins. Identified advantages and limitations of this technique were collected.

Results: In total, 22 patients had surgery for removal of spinal hemangioblastomas. Intraoperative ICG videoangiography was performed in 13 surgeries for resection of intramedullary hemangioblastomas (59.1 %). In 11 of the selected cases (84.6 %), the applied intraoperative ICG videoangiography provided useful information about the vascularization of the tumor and was therefore considered helpful (Figure 1). In two cases, the pathological vessels could not be clearly defined as tumor-feeding or draining vessels. Complete tumor removal was achieved in all patients without occurrence of complications or new persistent neurological deficits.

Conclusion: ICG videoangiography offers real-time intraoperative imaging of the tumor vasculature and thus improves surgical decision-making. It should be noted that ICG videoangiography requires direct microscopic visualization of the structures to be assessed. For tumors/vessels that are located deeper in or covered by the myelon or other structures, the information gain from ICG videoangiography is limited.



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