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IMPACT OF INTRACRANIAL PRESSURE MONITORING ON OUTCOME OF TRAUMATIC BRAIN INJURY IN PEDIATRIC PATIENTS: A 15-YEAR SINGLE CENTER EXPERIENCE AND LITERATURE REVIEW

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Objective: Intracranial pressure (ICP) monitoring is widely becoming a standard of neurocritical care for traumatic brain injury (TBI) pediatric patients. Among invasive monitoring devices, intraparenchymal implantable microtransducers are increasingly used in children, based on current recommendations mainly extrapolated from adult studies.
Methods: The present study is a retrospective case series review designed to evaluate whether ICP monitoring could influence clinical decisions and further alter prognosis in TBI pediatric patients. Demographic, injury severity, and radiologic characteristics were used as possible predictors of intracranial hypertension (ICH) or of bad outcome.
Results: A total of 203 pediatric intensive care unit (PICU) patients with TBI were included in the study. In most of the cases clinical decisions were guided by invasive ICP monitoring devices (69.5% with intraparenchymal ICP monitors and 6% with external ventricular devices/ EVDs). A positive trend of favorable outcomes was noted after more active implementation of currently accepted ICP monitor-based pediatric protocols (87% of children with good recovery vs 78% in previous years, OR: 1.74; 95% CI: 0.61-4.98; p=0.2). Kaplan-Meier survival analysis determined a significant difference for good recovery among the ICP monitored group of patients, compared to the non-ICP monitored group (log-rank chi-square= 13.15, p< 0.001) The ICP monitored group had a longer length of stay in PICU (21 vs 6 days, p< 0.001) and more ventilator days (16 vs 4 days, p< 0.001).
Conclusions: Intraparenchymal ICP monitoring could efficiently guide therapeutic decisions, with the confirmation of low complication rates reported by multiple studies. Future prospective observational studies could possibly update therapeutic guidelines based on ICP monitoring advantageous information.

6 PEDIATRIC NEUROSURGERY

6.1 Hydrocephalus and CSF Dynamics

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CSF LEAK AFTER CRANIAL SURGERY IN THE PEDIATRIC POPULATION: PRELIMINARY RESULTS OF A RETROSPECTIVE MULTICENTER STUDY

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Background: Incisional cerebrospinal fluid (CSF) leak is a complication with potentially serious consequences such as wound-healing problems, surgical site infection, meningitis and pneumocephalus. This study aims to establish the incidence of CSF leak after intradural cranial surgery in the pediatric population. In addition, the rate of complications related to CSF leak, the consequences concerning hospital stay and the treatment in the pediatric population are evaluated.
Methods: We performed a retrospective cohort study in three tertiary neurosurgical referral centers, two in the Netherlands and one in Switzerland. All consecutive patients aged 18 years or younger who underwent intradural cranial surgery between 2015 and 2021 with complete follow-up to at least 6 weeks and a complete surgical report available were included. Burr-hole and transsphenoidal procedures were excluded. Primary outcome measure was the incidence of CSF leak within 6 weeks after surgery.
Results: We included a total of 844 cases. The most common indication for surgery was tumor resection (50.1%), followed by epilepsy (38.6%) and vascular (7.5%) surgery. The incidence of CSF leak was 6.8%. Compared to patients without leakage, patients with CSF leak have higher odds of pseudomeningocele (7.0, 95% CI 3.9-12.5), meningitis (25.5, 95% CI 11.8-55.0) and surgical site infection (2.7, 95% CI 2.7-21.1). CSF leak caused a mean 5.8 (SD 7.5) days of prolonged hospital stay, while 18/57 (31.6%) of patients were re-admitted because of CSF leak. Invasive treatment (defined as placement of a CSF diverting shunt, lumbar puncture, puncture of the pseudomeningocele or surgical wound revision) was performed in 47.4%. There were no significant differences in the incidence of CSF leak or treatment modalities applied among the three centers.
Conclusion: The incidence of CSF leak after cranial surgery in the pediatric population is significant, with substantial consequences of secondary problems, prolonged hospitalization and the necessity for invasive treatment.

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COMPARISON OF LONG-TERM FUNCTIONALITY AND REVISION RATE OF TWO DIFFERENT SHUNT VALVES IN PEDIATRIC AND ADULT PATIENTS

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Background: The most frequent therapy of hydrocephalus is the implantation of ventriculoperitoneal shunts for diverting cerebrospinal fluid from the ventricles into the peritoneum. We compared two adjustable valves, the proGAV and proGAV 2.0, for complications which resulted in revision operations.
Methods: Four hundred patients who underwent primary shunt implantation between 2014 and 2020 were analyzed for overall revision rate, one-year revision rate, revision free survival and overall survival observing patient age group, gender, etiology of hydrocephalus, implantation site, prior diversion of cerebrospinal fluid and cause of revision.
Results: All data were available of all 400 patients (female/male 208/192). Overall, 99 patients underwent revision surgery after primary implantation. ProGAV valve was implanted in 283 patients, proGAV 2.0 in 117 patients. There was no significant difference between the two shunt valves concerning revision rate (p=0.8069), one-year revision rate (p=0.9077), revision free survival (p=0.6921) and overall survival (p=0.3232). Furthermore, regarding one-year revision rate, we observed no significant difference between the two shunt valves in pediatric patients (40.7% vs 27.6%; p=0.2247). Revision operation had to be performed more frequently in pediatric patients (46.6% vs 24.8%; p=0.0093) with a significant higher number of total revisions with proGAV than proGAV 2.0 (55.9% vs. 27.6%; p=0.0110) most likely due to longer follow up in the proGAV -group.
Conclusion: According to the target variables we analyzed, aside from lifetime revision rate in pediatric patients there is no significant difference between the two shunt valves. From our subjective point of view, implantation of the newer proGAV 2.0 valve is preferable due to higher adjustment comfort for both patients and physicians.

6.2 Cranial congenital malformations

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FACIAL DYSMORPHISMS AND SEVERE HYPOCALVARIA: A CHALLENGING AND OFTEN LATE DIAGNOSIS FOR CLEIDOCRANIAL DYSPLASIA

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Background: The term hypocalvaria was firstly introduced in the 90s, with the description of several cases of hypoplastic membranous neurocranium in newborns following intra-uterine exposure of Ace-inhibitors. The latter have been associated to fetal hypotension with hypoxic effects on the kidneys and calvaria. Few cases of hypocalvaria are part of the syndromic presentation of cleidocranial dysplasia, an autosomal dominant disorder of the RUNX2 gene with an estimated incidence of 1 case every 1,000,000. Due to its rarity and different clinical presentation, diagnosis may be challenging. Moreover, in 30% of cases genetic mutations are absent, further challenging early diagnosis.
Methods: Clinical, radiological, and genetic criteria were applied to research the etiology underlying severe hypocalvaria in a newborn from a healthy primigravida.
Results: At 37.4 weeks of gestation, a 2.9kg boy with a 46 XY karyotype was