Ventriculoperitoneal shunt placement

J.Sales-Llopis

Neurosurgery Department, University General Hospital of Alicante, Spain —-

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Ventriculoperitoneal shunt is a type of cerebrospinal fluid shunt and one of the most commonly performed neurosurgical procedures.

It has routinely been performed since the 1950s following the first working shunt valve developed by John Holter and Eugene Bernard Spitz the Spitz Holter valve [1)].

Indications

Ventriculoperitoneal shunt placement indications.

Technique

Ventriculoperitoneal shunt placement technique.

VP shunt, post-op orders (adult)

1. flat in bed (to avoid overshunting and possible subdural hematoma) with gradual mobilization

2. if the peritoneal end is new or revised, do not feed until bowel sounds resume (usually at least 24 hrs, due to ileus from manipulation of peritoneum)

3. shunt series (AP & lateral skull, and chest/abdominal X-ray) as a baseline for future comparison (some surgeons obtain these films immediately post-op in case some immediate revision is indicated, e.g. ventricular catheter tip in temporal horn).

Complications

see Ventriculoperitoneal shunt complications.

Case series

2017

VP shunts were placed in 3,984 patients either as an initial placement (n = 1,093) or as a revision (n = 2,891). Compared to the initial-placement group, the revision group was significantly more likely to experience shunt failure (14 vs. 8%, p < 0.0001). In the initial-placement group, congenital hydrocephalus was independently associated with shunt failure (OR 1.83; 95% CI 1.01-3.31, p = 0.047). In the revision group, cardiac risk factors (OR 1.38; 95% CI 1.00-1.90, p = 0.047), a chronic history of seizures (OR 1.33; 95% CI 1.04-1.71, p = 0.022), and a history of neuromuscular disease (OR 0.61; 95% CI 0.41-0.90, p = 0.014) were independently associated with shunt failure.

2016

Iglesias et al., undertook a retrospective study in pediatric patients treated with ventriculoperitoneal shunts between 2000 and 2015.

Surgical outcome was assessed, and different shunt survival curves were studied with Kaplan-Meier. Complications related to each shunt failure were examined and compared.

A total of 166 patients underwent 425 procedures, with a mean follow-up period of 93 months. The median number of shunt revision surgeries was 2. Shunt survival rates were better with the first shunt compared to those with the subsequent shunts. The main complication necessitating system revision surgery was overdrainage, the frequency of proximal and distal dysfunctions was similar in all the shunt failures, and isolated ventricle and infection were more frequent in younger patients. Shunt-related infections accounted for 7 % of the procedures, and the shunt independence rate was 10 %.

The frequency of complications related to shunt failure in pediatric patients changes during follow-up. A strict protocol of overdrainage detection and active treatment could explain the need for repeat surgeries and the progressively shorter shunt survival time in this series [2].

Identifying the factors associated with VP shunt failure may allow the development of interventions to decrease failures. Further refinement of the collected variables in the ACS National Surgical Quality Improvement Program (NSQIP) Pediatric specific to neurosurgical procedures is necessary to identify modifiable risk factors [3].

A single-institutional, retrospective study was conducted by reviewing 124 patients who had ventriculoperitoneal shunting (VPS) including revisions and subgroup analysis was done in 109 patients less than 18 years old classified as children who had first-time shunt placement;between January 2011 and December 2013. Data analysis was done using Microsoft Excel and SPSS (Version 20.0).

The mean age at shunt insertion of the subgroup was 5.35 ±1.264 SD years. Shunt-related complications were identified in 37 of the patients(33.9%). Infections were the most common form of complication occurring in 16 patients (14.6%). The overall mortality of the 109 patients was 4.59%.

The most common indications for shunt insertions were tumoural and congenital lesions and that may offer us benefit with the use of endoscopic third ventriculostomy. Comprehensive follow-up of these patients may give a better picture of the magnitude of the problem; hence the need for properly designed prospective studies to improve the current outcomes [4].

2011

Adult patients who underwent ventriculoperitoneal shunt placement for hydrocephalus from October 1990 to October 2009 were included. Medical charts, operative reports, imaging studies, and clinical follow-up evaluations were reviewed and analyzed retrospectively for clinical outcome in adult hydrocephalus patients.

A total of 683 adult patients were included in the study. The most common etiologies of hydrocephalus include idiopathic (29%), tumors and cysts (20%), postcraniotomy (13%), and subarachnoid hemorrhage (13%). The overall shunt failure rate was 32%, and the majority (74%) of shunt revisions occurred within the first 6 months. The median time to first shunt revision was 9.31 months. Etiology of hydrocephalus showed a significant impact on the incidence of shunt revision/failure and on the median time to shunt revision. Similarly, the type of hydrocephalus had a significant effect on the incidence of shunt failure and the median time to shunt revision.

A large proportion of patients (32%) experience shunt failure after shunt placement for hydrocephalus. Although the overall incidence of shunt revision was comparable to previously reported studies, the fact that a large proportion of adult populations with shunt placement experience shunt failure is a concern [5].

1)
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2)
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3)
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4)
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5) Reddy GK, Bollam P, Shi R, Guthikonda B, Nanda A. Management of adult hydrocephalus with ventriculoperitoneal shunts: long-term single-institution experience. Neurosurgery. 2011 Oct;69(4):774-80; discussion 780-1. doi: 10.1227/NEU.0b013e31821ffa9e. PubMed PMID: 21508873.