Available online at www.sciencedirect.com
ScienceDirect
journal homepage: http://www.elsevier.com/locate/pjnns

Original research article

Our initial experience with ventriculo-epiplooic shunt in treatment of hydrocephalus in two centers

Valentin Titus Grigorean [a], *Aurelia Mihaela Sandu* [b,*], *Mihai Popescu* [c], *Ioan Stefan Florian* [d], *Cristian Dumitru Lupascu* [e], *Corina Lupascu Ursulescu* [e]

[a] *University of Medicine and Pharmacy "Carol Davila", Department of General Surgery, Emergency Clinical Hospital Bagdasar-Arseni, Bucharest, Romania*
[b] *Fourth Department of Neurosurgery, Emergency Clinical Hospital Bagdasar-Arseni, Bucharest, Romania*
[c] *University Pitesti, Department of Neurosurgery, Emergency County Hospital Arges, Pitesti, Romania*
[d] *University of Medicine and Pharmacy "Iuliu Hatieganu", Cluj-Napoca, Romania*
[e] *University of Medicine and Pharmacy "Grigore T. Popa", Emergency County Hospital St. Spiridon, Iasi, Romania*

ARTICLE INFO

Article history:
Received 14 September 2016
Accepted 26 April 2017
Available online xxx

Keywords:
Epiploon
Greater omentum
Hydrocephalus
Ventriculo-epiplooic shunt
Ventriculo-peritoneal shunt failure

ABSTRACT

Introduction: Hydrocephalus represents impairment in cerebrospinal fluid (CSF) dynamics. If the treatment of hydrocephalus is considered difficult, the repeated revisions of ventriculo-peritoneal (VP) shunts are even more challenging.
Objective: The aim of this article is to evaluate the efficiency of ventriculo-epiplooic (VEp) shunt as a feasible alternative in hydrocephalic patients.
Material and methods: A technical modification regarding the insertion of peritoneal catheter was imagined: midline laparotomy 8–10 cm long was performed in order to open the peritoneal cavity; the great omentum was dissected between its two layers; we placed the distal end of the catheter between the two epiplooic layers; a fenestration of 4 cm in diameter into the visceral layer was also performed.

A retrospective study of medical records of 15 consecutive patients with hydrocephalus treated with VEp shunt is also presented.
Results: Between 2008 and 2014 we performed VEp shunt in 15 patients: 5 with congenital hydrocephalus, 8 with secondary hydrocephalus and 2 with normal pressure hydrocephalus. There were 7 men and 8 women. VEp shunt was performed in 13 patients with multiple distal shunt failures and in 2 patients, with history of abdominal surgery, as de novo extracranial drainage procedure. The outcome was favorable in all cases, with no significant postoperative complications.

* *Corresponding author at*: Fourth Department of General Surgery, Emergency Clinical Hospital Bagdasar-Arseni, Bucharest, Romania, Address: Emergency Clinical Hospital Bagdasar-Arseni, Department of Neurosurgery, No. 12 Berceni Road, District 4, Bucharest, 041902, Romania.
E-mail address: aurasandu@gmail.com (A.M. Sandu).
http://dx.doi.org/10.1016/j.pjnns.2017.04.007

Conclusions: VEp shunt is a new, safe and efficient surgical technique for the treatment of hydrocephalus. VEp shunt is indicated in patients with history of recurrent distal shunt failures, and in patients with history of open abdominal surgery and high risk for developing abdominal complications.

1. Introduction

The real incidence of hydrocephalus in the general population is as of yet uncertain, the prevalence being estimated at 1–1.5% [1–3], while gender distribution is considered equal. Age distribution has two peaks: the first during infancy, predominantly congenital hydrocephalus, whereas the second peak is found in adults, where normal pressure hydrocephalus is encountered [2].

If not properly treated, hydrocephalus signifies high morbidity and mortality, causing severe and permanent neurological consequences. The cumulative costs implied for the diagnosis and treatment of these patients are often insurmountable [4].

Management of hydrocephalus is a challenging endeavor, numerous therapies having been devised across history. To this day, surgery remains the treatment of choice for hydrocephalus, no medical remedy being effective. Several surgical techniques have been described, grouped as internal, external or extracranial drainages. Third ventriculostomy, first reported by Dandy and later improved by Stookey and Scarff [5], belongs to the internal drainage techniques. External ventricular drainage (EVD) can only be utilized for a limited amount of time. Extracranial ventricular drainages are among the most frequently used in the treatment of hydrocephalus. They are represented by VP shunt, ventriculoatrial shunt, lumboperitoneal shunt and ventriculopleural shunt. From a historical perspective, other drainages have been reported that are currently abandoned or rarely used, such as the ventriculosubgaleal shunt, ventriculocholecystic shunt, ventriculoureteral shunt, lumboureteral shunt, ventriculomastoid drainage, ventriculosternal shunt, drainage into the thoracic duct, salivary gland, spinal epidural space, bone stomach, ileum and fallopian tube [2,6–12]. Ventriculosinusal shunts, such as ventriculosagittal [13] or ventriculotransverse shunts [14], being considered anatomically and physiologically the most appropriate treatment of this disease, have also been attempted. We previously reported the ventriculo-epiplooic (VEp) shunting in animal models [15].

The objective of this study is to report our initial experience with the VEp shunt in human patients, and review the surgical technique. We also aim to establish the indications, emphasize the advantages compared with the standard VP shunt, and evaluate its efficiency and safety by analyzing immediate and long-term results.

2. Material and methods

We retrospectively reviewed medical records of consecutive patients with positive diagnosis of hydrocephalus, in which we had performed VEp shunts between February 2008 and July 2014, in two centers. In order to perform VEp shunt, we used a basic shunt tray and a cerebrospinal fluid (CSF) drainage system: ventricular catheter, peritoneal catheter, and valve (high, medium, low or programmable) or connector.

The surgical technique is standard for the cranial step (lateral ventricle catheterization) and subcutaneous tunneling carried from the right retromastoidian region, right anterolateral side of the neck, anterior thorax on the midclavicular line to the mid-anterior abdomen, and distal tube insertion into this subcutaneous tunnel. The abdominal step had a few differences from the classical VP shunt procedure. First, a midline laparotomy of 8–10 cm in length was performed, and then the peritoneal cavity was opened, revealing the greater omentum. Next, a dissection between the two layers of the great omentum was performed and the distal end of the catheter was placed between these two layers, in a declivitous position. The catheter was fixed in place with a simple suture. An epiplooic fenestration in the visceral layer, 4 cm in diameter, was also produced. Surgery was concluded with careful hemostasis and parietoraphy in anatomical layers.

3. Results

Between February 2008 and July 2014 we performed VEp shunts in 15 patients with hydrocephalus. We performed VEp shunt 13 patients with prior VP shunt and multiple distal shunt failures with shunt revisions, varying in number from 1 to 38. In two cases with nonfunctional third ventriculostomy, we practiced VEp shunt as a first extracranial drainage procedure, without attempting a VP shunt beforehand (Table 1).

We performed it in all types of hydrocephalus, thus 5 patients had congenital hydrocephalus, 8 patients had secondary hydrocephalus and 2 patients had normal pressure hydrocephalus. There were 7 men and 8 women.

All patients with congenital hydrocephalus were diagnosed during the first year of life. Patients with congenital hydrocephalus also presented additional developmental anomalies, such as porencephalic cyst in two cases, agenesis of the corpus callosum and pineal region cyst in two cases, posterior fossa arachnoid cyst, Dandy–Walker malformation in one case, and a Chiari II malformation with associated lumbar meningomyelocele. This stands as evidence that congenital hydrocephalus occurs in the complex context of developmental anomalies. In all five patients, VP shunt was performed as first choice therapy in the first year of life. These five patients belong to a special group of patients with repetitive VP shunt failures and multiple shunt revisions. Before the VEp shunt attempt, the number of shunt revisions was impressive

Please cite this article in press as: Grigorean VT, et al. Our initial experience with ventriculo-epiplooic shunt in treatment of hydrocephalus in two centers. Neurol Neurochir Pol (2017), http://dx.doi.org/10.1016/j.pjnns.2017.04.007