Distal obstruction

Distal obstruction is a common cause of shunt failure and need for revision in patients undergoing ventriculoperitoneal shunting (VPS) for idiopathic normal pressure hydrocephalus (iNPH).

Etiology

The shunt obstruction is caused by fibrosis and is usually located on the tip of the ventricular catheter (proximal obstruction) and/or peritoneal catheter (distal obstruction).

Case series

Records of patients with iNPH treated with VPS between 2001 and 2017 were reviewed. Patients undergoing initial shunt placement at Department of Neurosurgery, Mayo Clinic, Rochester, Minnesota USA institution were included for analysis and the incidence of revision surgery due to distal obstruction was noted. Risk factors for distal obstruction were identified using a stepwise Cox proportional hazards model.

There were 341 patients included for analysis. Assistance from a general surgeon in placement of the peritoneal catheter was provided in 54 patients (15.8%). Shunt revision was necessary in 69 patients (20.2%), with 17 patients (5.0%) found to have a distal malfunction. On univariate analysis, increasing age was associated with reduced risk of distal malfunction (Unit RR 0.92, 95% CI 0.89-0.96; p < 0.001). BMI \ge 38.9 (RR 6.60, 95% CI 1.84-19.00), prior abdominal surgery (RR 2.95, 95% CI 1.11-7.70; p = 0.032), and fixed-setting valve (RR 6.24, 95% CI 1.27-112.72; p = 0.020) were associated with increased likelihood of distal malfunction. General surgery involvement had no effect on distal malfunction rates (OR 1.30, 95% CI 0.25-3.21; p = 0.693). On multivariate analysis, increasing age (Unit RR 0.92, 95% CI 0.89-0.95; p < 0.001) and prior abdominal surgery (RR 3.30, 95% CI 1.23-8.71; p = 0.019) were independently associated with decreased and increased risk of distal obstruction, respectively.

Rinaldo et al. identify multiple factors associated with distal shunt obstruction, and found that general surgery assistance was not protective against distal malfunction. These data may aid in the risk-stratification of patients undergoing VPS for iNPH¹.

Open or laparoscopic distal catheter insertion was performed in 335 and 475 patients, respectively. There were no significant differences between the groups regarding age, race, ASA score, or indication for shunt placement. The most common indication was hydrocephalus due to subarachnoid hemorrhage, followed by tumor-associated hydrocephalus, normal pressure hydrocephalus (NPH), and hydrocephalus due to trauma. The incidence of shunt failure was not statistically different between cohorts, occurring in 20.0% of laparoscopic and 20.9% of open catheter placement cases (p = 0.791). With analysis of causes of shunt failure, shunt obstruction occurred significantly more often in the open surgery cohort (p = 0.012). In patients with a known cause shunt obstruction, distal obstruction occurred in 35.7% of the open cohort obstructions and 4.8% of the laparoscopic cohort obstructions (p = 0.014). The relative risk of distal obstruction in open cases compared with laparoscopic cases was

7.50. Infections occurred in 8.2% of laparoscopic cases compared with 6.6% of open cases (p = 0.419). Within the NPH subgroup, the laparoscopically treated patients had significantly more overdrainage (p = 0.040), whereas those in the open cohort experienced significantly more shunt obstructions (p = 0.034). Laparoscopically treated patients had shorter operative times (p < 0.0005), inpatient LOS (p < 0.001), and inpatient LOS after VP shunt placement (p = 0.01) as well as less blood loss (p = 0.058).

This is the largest reported comparison of distal VP shunt catheter insertion techniques. Compared with minilaparotomy, the laparoscopic approach was associated with decreased time in the operating room and a decreased LOS. Moreover, laparoscopy was associated with fewer distal shunt obstructions. Laparoscopic shunt surgery is a viable alternative to traditional shunt surgery ²⁾.

1)

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