



### Introduction

For both pediatric and adult neurosurgeons, ventriculoperitoneal shunt revision is a common procedure. Disconnection and fracture of the distal catheter remains a frequent cause of shunt malfunction, especially in growing children. We describe a novel procedure for peritoneal replacement of a distal catheter using a guidewire and a modified Seldinger technique.

#### Methods

After making incision to expose the shunt valve, distal shunt malfunction was confirmed. The patient's prior abdominal incision was incised and exposed in a standard fashion. The failed distal catheter was identified, slightly elevated, and cut. The proximal portion of this cut catheter was removed, leaving the distal end with an opening into the peritoneum (Figure 1A). Next, a soft 0.035" diameter guidewire with hydrophilic coating (Terumo, Radiofocus Glidewire, Urologic wire, Straight) was inserted into the cut end of the distal catheter and was passed into the peritoneal space (Figure 1B). The remaining portion of the cut distal cathter was then removed by passing it from the peritoneal space, over the guidewire (Figure 1C), leaving the guidewire in place (Figure 1D). A 13 French peel-away introducer sheath and dilator (Company) were then inserted over the guide wire (Figure 1E). Once the introducer sheath was in the peritoneal space, the guide wire and dilator were removed (Figure 1F). A new distal catheter was then connected to the valve and passed from the valve down to the abdominal incision in a standard fashion. The cephalad portion of the distal catheter was then passed into the peritoneum through the peel-away sheath introducer (Figure 1G), and the peel-away sheath was removed (Figure 1H).A database of shunt patients was retrospectively analyzed, and 68 patients were found who had replacement of a distal catheter using this technique.



## Results

The mean age at surgery was 13 years (range 2-22). Other preoperative data are shown in Table 1. No immediate acute complications were noted. Of the 68 total patients, 35 patients had greater than 6 months follow-up (range 6-80 months). Of the 68 patients, 7 patients were noted to have required another distal revision (mean time of 188 days after the original surgery).

Preoperative Sym	ptoms Exhibited (percentag	e of total)	
	НА	37 (54)	
	asymptomatic	21 (31)	
	nausea and/or emesis	17 (25)	
	Neuro changes	15 (22)	
	Decreased LOC	8 (12)	
	Seizure	7 (10)	
	Neck Pain	4 (6)	
Head CT			
	Total		63
	Ventricular enlargment		40
	No prior for comparison		5
	No interval change		18
Shunt Series			
	Total		62
	showed fracture		50
	shortened catheter		1
	appeared intact		11
Shunt Aspiration			
	Total		10
	Poor proximal flow		4
	Poor distal flow		8

# Conclusions

It is now well established that the length of procedure directly impacts the risk of shunt infection, so techniques that can safely increase the speed of surgery could possibly improve shunt outcomes.

#### **Learning Objectives**

By the conclusion of this session, participants should be able to: 1) Describe the method of changing the peritoneal portion of a distal catheter over a guidewire, 2) Discuss the common causes of distal shunt failure, 3) Discuss the risks and benefits of exchanging the distal catheter by this method