

Uncommon use of PICC as an atrial part of the ventriculo-atrial shunt in children.

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Introduction :

In paediatric patients, ventriculo-atrial shunt (VAS) is usually implanted as a second-line option for patients with shunt-dependent hydrocephalus, when the ventriculo-peritoneal shunt (VPS) is not option¹. VAS in children often (30-96,4 %)² required tube revision procedures due to the numerous complications (distal obstruction, thrombosis, infection, patient overgrowing ...)

Method:

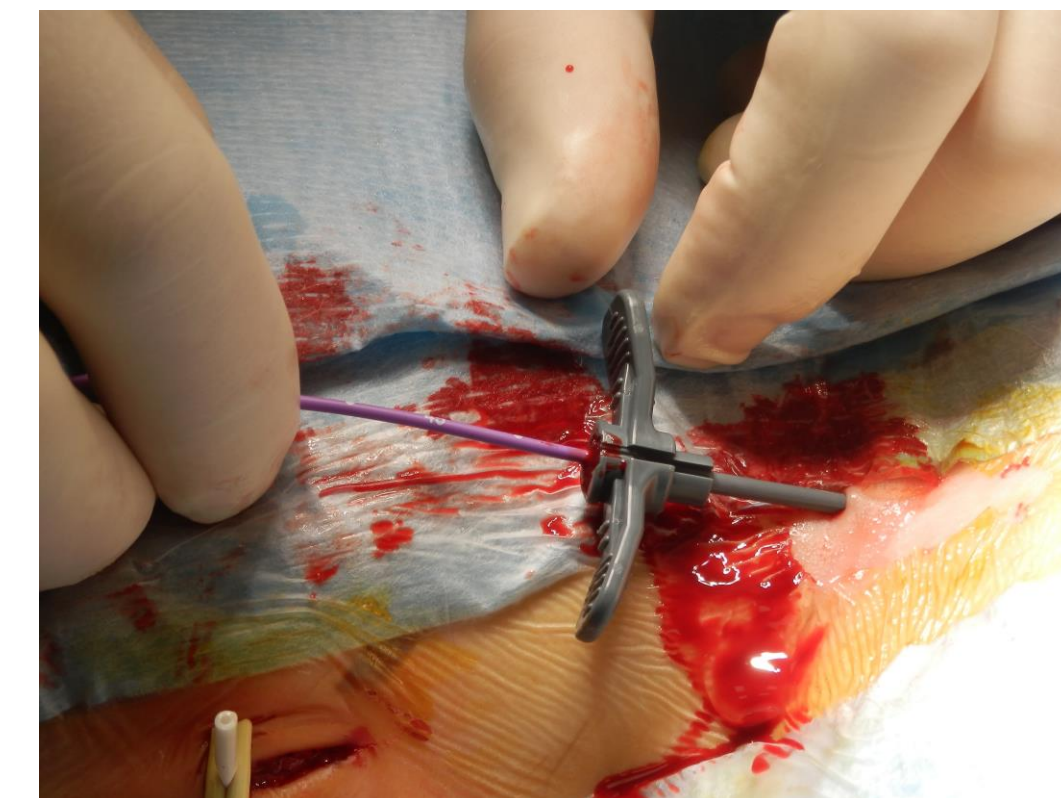
Our approach was using of 5 Fr power injectable PICC as a distal part of V-A shunt. To minimize vessel damage we used the standard US guided IVJ puncture technique with micro-puncture set (pict No1) and 5,5 Fr peelable sheath introducer (pict No2). We connected the cranial part of VAS and power injectable PICC (pict No5) as a distal part of VAS with a standard CODMAN® shunt connector (pict No4). The optimal depth of the atrial catheter was confirmed by IC-ECG guidance³ (pict No3).

Results:

We installed 5 VAS in 4 patients, who has had previous VPS malfunction or infection. Their ages ranged from 3 months to 6 years. In our group, there were 2 VAS infections that resulted in shunt extraction and temporary EVD insertion. New VAS was installed in the 1-st case.. In the 2-nd case, there was VPS installed instead,



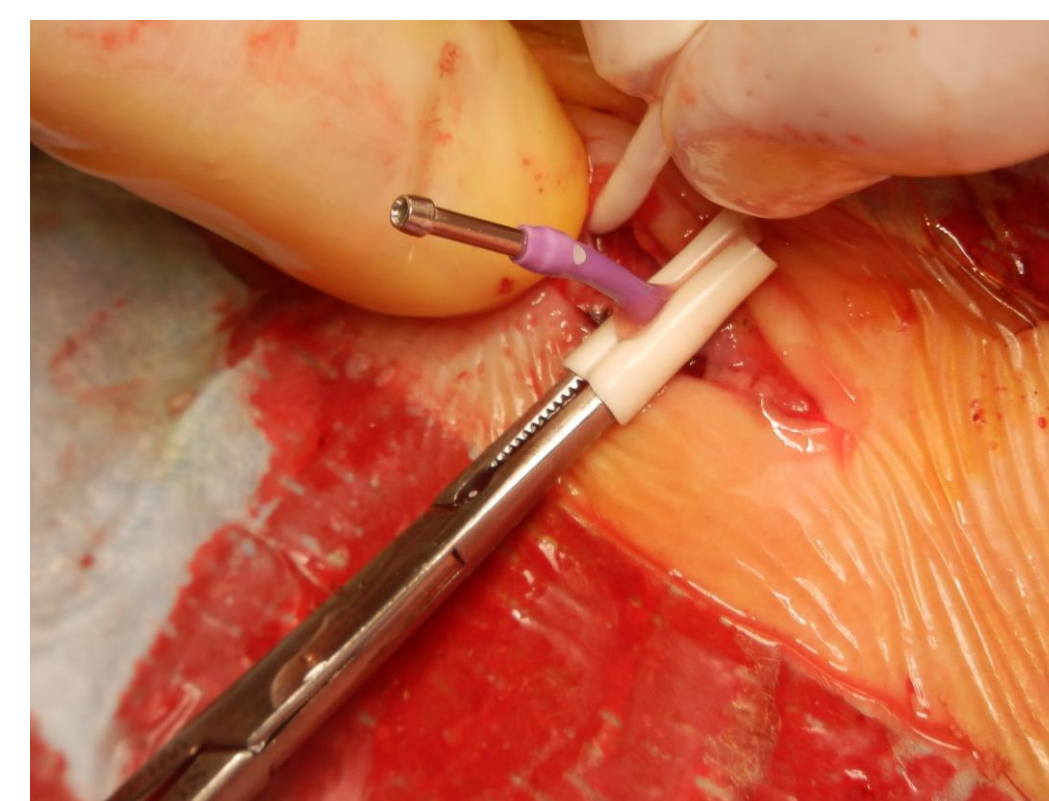
Pict No1



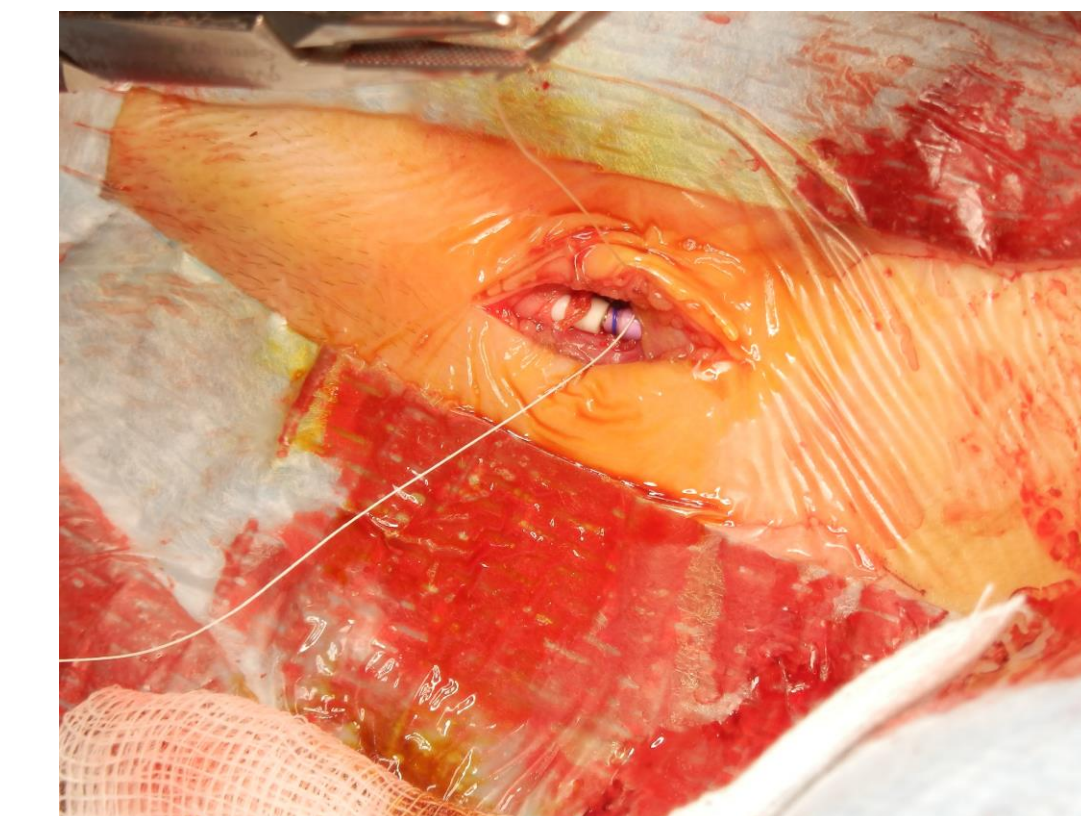
Pict No2



Pict No3



Pict No4



Pict No5

Age / (Date of VAS insertion)	Diagnosis	Comorbidity	Reason for VAS inseertion	Complications	Dwel time / solving complications
3 months (30.5.2018)	Sacral spina bifida with hydrocephalus	Paraparesis, Incontinency alvi et urinae	Malfunction of VPS Peritonitis Abdominal adhesions	VAS infection	4 months / temporary EVD and next VAS insertion
5 months (3.1.2021)	Posthemorrhagic hydrocephalus	Perinatal asphyxia Agenesis of the corpus callosum Psychomotor impairment	Repeated malfunction of VPS Peritonitis Abdominal adhesions	VAS infection	9 months/ temporary EVD and VPS insertion
20 months (the same patient from case No1) (20.10.2019)	Sacral spina bifida with hydrocephalus	Paraparesis, Incontinency alvi et urinae		Fibroblastic sleeve , VAS malfunction	17 months / reinsertion distal part of VAS (in age of 3,5 year VPS insertion)
1 year (23.11.2021)	Congenital hydrocephalus	Hypotonia	Cerebrospinal fluid hypersecretion Ascites VPS malfunction	0	till today
6 years (2.6.2022)	Dandy-Walker syndrom	M.Down M.Hirschprung	Cerebrospinal fluid hypersecretion Ascites VPS malfunction	0	till today

because of the intra-abdominal space improvement. The malfunction of the atrial shunt caused by the fibroblastic sleeve was observed in the 3-rd case. It was solved by the exchange of the atrial part of VAS and at the age of 3,5 years was changed to VPS because of patient overgrowing. In the 4-th and 5-th cases, VAS has been working without any complications.

Discussion & Conclusion:

The original catheter for VAS is risky for thrombotic complications in small children due to its size. Off-label use of PICC as a distal part of V-A shunt may lead to a lower rate of thrombotic and mechanical complications, due to its lower diameter, using of micro-puncture technique for insertion and using of smaller diameter peelable sheath introducer compared to standard sheath and introducer. IC-ECG helps to insert the tip of the atrial part of the shunt to the right position more precisely compared to fluoroscopy.

References:

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