CASE REPORT

Extensive Fibrosis Around Ventricular Catheter And Shunt Malfunction

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Abstract
Peritoneal connective tissue sheath around the silicone ventriculo-peritoneal shunt tubing is a well know cause of shunt malfunction. Most commonly it involves the peritoneal end and nuchal part of shunt tube. We report first case of shunt malfunction due to extensive fibrous tissue at the entry of ventricular catheter treated successfully.

Key words
Ventriculoperitoneal shunt, shunt malfunction, fibrosis,

Introduction

Pericatheter connective tissue sheath around the silicone ventriculo-peritoneal (V-P) shunt tubing is often observed in children with V-P shunts and can lead to chronic malfunction of peritoneal catheter. [1, 2, 3] The cause of this shunt malfunction includes migration, outgrowth, disconnection or obstruction of the peritoneal shunt catheter. [1] We report an extremely rare case of shunt malfunction due to pericatheter connective tissue sheath at the cranial entry of ventricular catheter causing compression of shunt tube against the burr hole edge and treated successfully after excision of connective tissue.

Case report

Six months male child, a known case of aqueductal stenosis with hydrocephalus underwent right ventriculoperitoneal shunt at 4 months of age. Now he presented with recurrences of symptoms (increase in head size, sun set sign and not accepting feeds). There was no history of fever. Before shunt placement his head circumference was 53 cm and after shunt placement it reduced to 43 cm. At present admission again it increased to 47 cm with tense and non-pulsatile anterior fontanelle and prominent scalp veins. Local examination revealed a non-compressible, firm swelling at the cranial entry point of ventricular catheter over burr hole site. There was no local rise of temperature and skin over it was healthy. X-Ray skull showed shunt tube was in place. With all these features diagnosis of shunt malfunction was made. He underwent re-exploration and intra-operatively there was no flow of CSF from peritoneal end in-spite of pressing the chamber. Following that upper end was opened and it was covered with thick fibrous tissue. After releasing the fibrous tissue CSF started through the peritoneal end. These findings suggested that ventricular catheter was entrapped between burr hole edge and fibrous tissue and was responsible for shunt tube obstruction. Peritoneal end was replaced in the peritoneal cavity. Post-operatively, anterior fontanelle became lax and pulsatile, sun set sign also disappeared. On follow-up child head circumference is reduced and he is doing well.

Discussion: Silicone tube is commonly used for shunts because it induces fewer chemical reactions in tissues than other materials. [4, 5, 6] However longer-term experience has shown that implanted silicone tubing is not always totally inert. [7, 8, 9] Light microscopy of excised sleeves in patients with shunt malfunction has shown a fibrous reaction made up of hyalinized connective tissue composed of flattened collagen fibers with occasional fibrocytes. [9] In scanning electron microscope analyses of shunts in place for long periods it has disclosed irregular tube surfaces due to degradation, calcium deposits in dented portions of the tube, and fibrosis with calcification extending to the surrounding tissues. [7, 8] This phenomenon has been explained by variations in the quantity of silica and vulcanizing agent added to medical-grade silicone rubber may provoke a soft-tissue reaction. Static electrical charges on the tubing may hold dust and lint. Benzalkonium chloride may be absorbed into the silicone rubber and may reenter the body after implantation. Detergents and dissolved ethylene oxide gas may excite soft-tissue fibrosis. [9] In addition, polymers are known to undergo biodegradation as a result of hydration, splitting of covalent bonds, and dissolution and digestion by macrophages. [10] Over a period of time degradation of the tube surface will expose the impregnated barium, which induces chemical reactions and results in calcification and fibrosis. [8] This is the first case where fibrosis involved the extra-cranial part of the shunt catheter. This signifies that we should keep the possibility of this entity in our mind while treating the children with shunt malfunction as it can be treated by surgical excision of the fibrous tissue.

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