CASE REPORT

Lower motor neuron facial palsy after ventriculoperitoneal shunt surgery

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SUMMARY

A 40-year-old woman underwent marsupialisation of a symptomatic retrocerebellar cyst. She developed pseudomeningocele after the procedure. CT of the brain showed hydrocephalus. Therefore, a right-sided ventriculoperitoneal shunt procedure was performed. Unfortunately, the patient developed lower motor neuron-type facial paralysis immediately after the surgery. We localised the site of injury in the distal fallopian canal probably during tunnelling of the subcutaneous tract for passage of the shunt. We discuss the steps to be followed to avoid such mishaps with a brief review of the literature.

BACKGROUND

Ventriculoperitoneal (VP) shunt surgery is one of the most commonly performed neurosurgical procedures. However, it has the potential of causing diverse and bizarre complications if not performed by senior, experienced neurosurgeons. Lower motor neuron (LMN)-type facial weakness following VP shunt surgery caused by insult in its intracranial course has been previously described. We report the first case of a LMN-type facial palsy due to injury to the mastoid segment of the facial nerve that occurred during tunnelling of a VP shunt.

CASE PRESENTATION

A 40-year-old woman presented with dull aching neck pain and imbalance on walking for the past 1 year. This was followed by paraesthesia in her hands and feet, and clumsiness of grip in the right hand. On neurological examination, power was normal in all her limbs except for the weak right hand grip. A sensory system evaluation revealed that there was impaired touch and vibration sense in the right upper limb, and cerebellar signs were positive. A MRI scan of the brain with the cranio-vertebral junction showed a retrocerebellar cyst with compression over the fourth ventricle. The patient underwent marsupialisation of the cyst and decompression of foramen magnum. Her symptoms improved after the surgery. She presented with a pseudomeningocele and bouts of vomiting 1 month after of suture removal.

INVESTIGATIONS

A CT scan of the brain showed hydrocephalus with pseudomeningocele (figure 1A).

TREATMENT

The patient underwent right ventriculoperitoneal shunt surgery. There was difficulty tunnelling in the subcutaneous tract in the mastoid region.

OUTCOME AND FOLLOW-UP

In the immediate postoperative period, the patient developed a grade 5 House and Brackmann's Lower Motor Neuron type right facial palsy with barely perceptible gross facial motion, no forehead motion, asymmetry at rest and inadequate eye closure (figure 1B). Postoperative CT scan of the brain was performed, which showed resolution of the hydrocephalus with the shunt in situ (figure 1C).

The patient was evaluated for the site of facial nerve injury. Electromyography of the face revealed LMN-type right facial nerve palsy. The patient had no decrease in lacrimation (normal Shirmer's test) or altered, or decrease in, taste sensation (assessed clinically). High-resolution CT of the temporal bone showed a collection of blood in the right mastoid air cells, suggestive of hairline fracture (figure 1D). Thus we localised the insult to the facial nerve in the bony canal of the right temporal bone distal to the origin of the chorda tympani nerve. We assumed it to be neuropraxia of the facial nerve and treated the patient with oral steroids prednisone 1 mg/kg with gradual tapering. The patient has completely recovery of the facial weakness to grade I/II at follow-up of 3 months (figure 1E, F).

DISCUSSION

Iatrogenic facial palsy is a very rare but well-documented complication of maxillofacial surgery, dental procedures and anaesthesia. The site of injury in these cases is different. In the immediate type, either the aberrant facial nerve trunk in the retromandibular space or the facial nerve within the parotid fascia is injured or anaesthetised. The delayed form may result from the anaesthetic solution stimulating the sympathetic plexus connected to the external carotid artery, which communicates with the plexus-covering stylomastoid artery. By causing reflex vasospasm, this leads to ischaemia of the facial nerve. Another theory is that dental anaesthesia or surgery could act as a precipitating factor, reactivating latent herpes simplex virus.¹ Mastoidectomy also causes iatrogenic facial palsy most commonly at the second genu of the facial nerve. During superficial parotidectomy, branches of facial nerve may get injured.²

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Figure 1 (A) Axial image of the CT scan of the brain showing pseudomeningocele with hydrocephalus. (B) Axial image of CT scan of the brain showing resolution of hydrocephalus with shunt in situ and thin subdural bleed on right frontoparietal region. (C) Coronal image of high-resolution CT of temporal bone showing blood in the right mastoid air cells. (D) Clinical photograph of the patient showing right facial palsy of lower motor neuron-type. (E and F) Clinical photographs of the patient showing significant recovery of facial nerve palsy.

Following the first description of ventriculoperitoneal shunt surgery by Ferguson in 1898, there have been several reported complications of this procedure. These include ventriculitis, peritonitis, shunt extrusion per rectum, pseudocyst formation, shunt malfunction or disconnection, overdrainage and subdural hygroma formation, intestinal volvulus and bowel obstruction. However, facial nerve palsy as a result of ventriculoperitoneal shunt surgery is sparsely reported.³

A case of intracranial hypertension related to VP shunt failure as revealed by facial diplegia of LMN-type was reported by Thines *et al.*⁴ Eight cases of facial palsy of LMN-type after VP shunt in the isolated fourth ventricle have been reported, the mechanisms of which differ from each other. Direct injury to the brainstem by shunt tip was described by Lee and colleagues. Collapse of the shunted fourth ventricle causing shunt tips to touch the floor of the fourth ventricle resulted in delayed cranial neuropathies. This mechanism was reported by Eder and colleagues, and Rekate and colleagues. Traction injury to the cranial nerves caused by retraction of the brainstem after shunting of the isolated fourth ventricle was reported by Paang *et al.*⁵ But injury to the mastoid segment of the facial nerve during tunnelling has never before been reported.

For parieto-occipital VP shunt surgery, positioning is most important. The horseshoe headrest with a bolster placed under the shoulder ipsilateral to the catheter insertion site is used for the positioning. The head is tilted such that the cranial incision site is accessible. This is usually achieved by rotation and lateral flexion of the neck to the contralateral side.³ Less rotation of head in our case possibly led the trocar to the mastoid region.

Tunnelling is a potentially dangerous manoeuvre. The aim is to ensure that the device is subcutaneous throughout its course. There is no evidence that the direction of tunnelling, whether cranial to caudal or caudal to cranial, effects complications.

Potentially incorrect entries while tunnelling include the skin, peritoneum and its contents, pleural space and lung, heart and the great vessels of the neck, and the skull base, including the foramen magnum. As a rule, the tip of the trocar should be palpable below the skin at all times and should pass superficially to the ribs and clavicle. Common sites of resistance to tunnelling include the deep cervical fascia and skull base. If it is felt that excessive force is required to pass the tunneller, a separate incision should be made and retunnelling should commence from that location.³ In hindsight, we should have made a separate incision at the mastoid region when we encountered difficulty in tunnelling.

Learning points

- ▶ Lower motor neuron-type facial palsy is a rare but possible complication of ventriculoperitoneal shunt surgery that can occur during tunnelling.
- ▶ Correct positioning, the correct direction of tunnelling, and an extra incision if required, will prevent this disaster.
- ▶ A single stitch is better than a deformed face.

Competing interests None declared.

Patient consent Obtained.

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