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CASE REPORT REGIONAL ANESTHESIA

Caudal anesthesia for anorectal surgery in a rare case of syringomyelia in a day-surgery clinic

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ABSTRACT

Syringomyelia is a rare neurological disease that is characterized by a degenerated and cystic spinal cord. General or spinal anesthesia can cause development of or exacerbation of syringes in these patients, and the optimal anesthetic method for use in patients with syringomyelia remains unclear. Here, we present the case of a patient with syringomyelia in whom caudal anesthesia was used for anorectal surgery in a day-surgery clinic. Surgery was concluded successfully, without any neurological complications associated with syringomyelia. This case demonstrates that caudal anesthesia may be an option for non-obstetric surgery in patients with syringomyelia, if it is performed by experienced medical staff.

Keywords: Arnold Chiari Malformation; Ambulatory Surgical Procedures; Caudal Anesthesia; Hemorrhoids; LAST; PDPH; Syringomyelia; Valsalva Maneuver; Water-Hammer Effect

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1. INTRODUCTION

Syringomyelia is a rare, slowly progressive neurological condition that is characterized by the presence of a glial cell-lined syrinx, which is a fluid-filled cavity, within the spinal cord.[1] This condition is also associated with the Arnold Chiari malformation (ACM), in which the lower part of the brain pushes into the spinal canal.

The pathophysiology of syringomyelia remains poorly understood. Stimulation and increased propagation of pressure waves can lead to a transfer of fluid through the pial–glial membrane of the spinal cord, leading to disturbance and enlargement of an existing syrinx.[2] Moreover, a blockage of cerebrospinal fluid (CSF) drainage at the foramen magnum could lead to a "water-hammer" effect as proposed by Gardner's hydrodynamic theory, potentially leading to the formation or expansion of a syrinx.[3] Given the effects of anesthesia on CSF pressure, anesthesia in patients with syringomyelia should be carefully considered. At present, the management of anesthesia in syringomyelia patients is still a topic of debate and poses challenges in treatment decisions.[1]

To date, reports on syringomyelia have typically included some considerations of obstetric anesthetic management during delivery and labor,[1,4] but the safest mode remains unclear. Some authors favor regional anesthesia;[5,6] whereas others strongly support the use of general anesthesia (GA).[7] Nevertheless, non-obstetric anesthetic management in patients with syringomyelia has seldom been described.

Patients with anorectal disease experience pain and bleeding per rectum, which greatly deteriorates their quality of life. Surgery can be performed under ambulatory anesthesia in some cases. The incidence of anorectal disease is approximately 4–5%, [8] and thus it may occur in some patients with syringomyelia.

Here, we present the case of a female patient with syringomyelia who required anorectal surgery, a non-

obstetric procedure. We successfully administered ultrasound-guided caudal anesthesia (CA) and conducted the surgery successfully. Herein, we review this rare disease and report our successful treatment.

2. CASE REPORT

A 32-year-old woman visited our day-surgery clinic for anorectal surgery. She had back pain and had been diagnosed with thoracolumbar syringomyelia a few years ago. She underwent a cesarean section under monitored anesthesia care (MAC). No other syringomyelia-related neurological symptoms were present. She underwent an examination to diagnose anorectal disease (third degree hemorrhoids). Preoperative blood tests, electrocardiography, and chest radiography were also performed. No specific abnormalities were observed during the preoperative tests.

During the surgery, the patient was placed under CA. The patient was positioned facing downward, and the lumbosacral area was cleaned in a sterile manner for CA. CA was conducted using a high-frequency linear ultrasound probe (Versana Balance™, GE Healthcare, Chicago, IL, USA). The transverse linear transducer was initially positioned near the anus, at the midline where the sacral bone was observed. Next, the transducer was shifted towards the two sacral horns, the sacrum base, sacrococcygeal ligament, and sacral hiatus. The ultrasonography showed two hyperechoic structures at the two sacral cornua and base of the sacrum. The sacral hiatus was seen as a hypoechoic region between these hyperechoic structures. The probe was rotated vertically to obtain a sagittal view of the caudal space. CA was administered using 15 ml of lidocaine 2% with epinephrine 1%, after negative aspiration and was confirmed to be successful. Surgery was performed after 15 min. The patient was positioned in the prone-jack knife posture, and the anal canal was dilated with a finger. The pedicle was sutured, and bleeding was controlled. A gauze pack was then inserted. After surgery, the patient was transferred from the operating room to the general ward.

Three hours after the surgery, the patient was able to urinate and could walk early. Her vital signs were stable. She was discharged from the day-surgery clinic on the same day, without any complications. The patient was observed for one month after surgery, and the follow-up was completed without any complications.

3. DISCUSSION

Syringomyelia is a rare disease associated with several diverse conditions. It is commonly classified into three types; communicating, noncommunicating, and extracanalicular.[9] Describing syringomyelia involves direct communication between the syrinx and CSF-filled cerebral ventricles and is often linked with ACM. Damage to the spinal cord caused by trauma, post-infection, or tumors can result in noncommunicating syringomyelia. Extracanalicular syringes come from the spinal cord, but do not connect with the fourth ventricle or the central canal.

Symptoms of syringomyelia vary based on the location and size of the syrinx within the spinal cord. Patients may not have any symptoms, or exhibit a variety of symptoms, such as headache, sensory loss, autonomic dysfunction, and paralysis. Thoracic scoliosis can result from a lack of strength in the paraspinal muscles. Symptoms related to increased intracranial pressure are connected to ACM. If syringomyelia is suspected based on the patient's clinical presentation, magnetic resonance imaging (MRI) is the first choice for diagnostic workup. With the increasing use of MRI, the prevalence of diagnosed syringomyelia has increased, and is estimated to be approximately 10 cases per 100,000 young Korean males.[10]

There is still a debate over the safest method of administering anesthesia to patients with syringomyelia.[1] Anesthetic concerns in patients with syringomyelia involve the varying impacts of cranial CSF pressure above and spinal CSF pressure below the foramen magnum.[7] This varying impact could exacerbate following a lumbar puncture or spinal anesthesia, leading to the downward displacement of the cerebellar tonsils, constricting the brainstem.[7] Heiss et al.[11] found that spinal anesthesia causes an elevation in spinal subarachnoid pulse pressure above the nerve block, leading to a pressure difference across the blocked segment of subarachnoid space, causing syrinx formation or progression. They postulated that a subarachnoid block in the spinal cord shortens the subarachnoid space in the spinal cord, causing reduced compliance and impaired ability to dampen the subarachnoid CSF pressure waves that are produced by the brain expansion that occurs during systole.[11] On the other hand, another patient with syringomyelia underwent cesarean section twice, under spinal anesthesia without developing neurological complications.[4] However, as that report derived from a single center, it cannot be generalized that spinal anesthesia should be the first choice for surgery in patients with syringomyelia.

In a previous study, GA was the most commonly used anesthetic technique (70%) for cesarean delivery.[1] However, GA can induce increased ICP. Laryngoscopy after GA induction and coughing during emergence from GA may result in sudden increases in ICP.[1] The

activities such as coughing, sneezing, and the Valsalva maneuver is associated with craniospinal "pressure dissociation" within the spinal canal.[12] In fact, many clinicians have highlighted the potential for CSF pressure changes in association with the Valsalva maneuver or a decompressive/compressive effect in the epidural/subarachnoid space[1]. Clinicians should be very careful, particularly when administering GA, as intubation may be difficult.[13] Thus, choosing between general or spinal anesthesia in patients with syringomyelia is difficult, with many factors to consider depending on the patient type.

Anorectal diseases, which are common among working adults, are treated operatively in day-surgery clinics. When GA is used, the duration of anesthesia significantly exceeds the duration of the operation. The postoperative period can be complicated by events such as the residual effects of anesthetics, nausea, vomiting, and severe pain.[14] Spinal anesthesia is simple and easy to perform. However, the cardiovascular effects of spinal anesthesia include decreases in arterial blood pressure and central venous pressure, with only minor decreases in heart rate, stroke volume, and cardiac output.[15] Postdural puncture headache (PDPH) is a complication of spinal anesthesia.[8] Spinal anesthesia causes greater urinary retention and a longer length of hospital stay and recovery time than does MAC with local anesthesia in anorectal surgery.[16] Moreover, one case report described syrinx formation as a complication of a lumbar puncture performed for spinal anesthesia.[17]

Our institution mainly administers ultrasound-guided CA and operates a day-surgery clinic. CA is difficult to perform in adults, due to anatomical variations; however, in the recent years, it has increasingly been used due to advances in ultrasound technology. Ultrasound-guided CA is associated with higher patient satisfaction than achieved with spinal anesthesia.[18] Selective sensory and motor blocks can be produced in the anorectal area without creating a motor block in the legs, which leads to unrestricted ambulation and the ability to be discharge home soon.[8] CA is associated with almost no risk of complications, such as arterial hypotension, PDPH, or transitory radicular irritation.[8] Local anesthetic systemic toxicity (LAST) commonly occurs after caudal blocks in adults. Ultrasound guidance might reduce the incidence of vascular puncture associated with peripheral nerve block, as compared to peripheral nerve stimulation, which may help to prevent LAST.[19]

4. CONCLUSIONS

We successfully performed ultrasound-guided caudal anesthesia for non-obstetric surgery in a patient with syringomyelia, a condition that places patients at high risk of progression due to anesthesia, and were able to discharge the patient safely on the same day after anorectal surgery. This case indicates that caudal anesthesia could be considered as an option for non-obstetric surgery in patients with syringomyelia, if performed by experienced medical staff.

5. Conflict of interest

The authors declare no conflict of interest.

6. Ethical considerations

Patient consent was obtained for the case report.

7. Authors contribution

Both authors took part in the conduct of this case and preparation of this manuscript.

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