Foramen Magnum Meningioma in a Young Adult Female: A Case Study with Nursing Implications

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***Abstract*—Background: Foramen magnum meningiomas (FMMs) are uncommon benign intracranial tumours that originate from the meninges surrounding the craniovertebral junction. They account for approximately 1.8–3.2% of all intracranial meningiomas and pose significant diagnostic and surgical challenges due to their proximity to the medulla oblongata, lower cranial nerves, vertebral arteries, and upper cervical spinal cord. Patients frequently present with nonspecific neurological manifestations, resulting in delayed diagnosis. Early recognition, accurate neuroimaging, meticulous microsurgical excision, and comprehensive perioperative nursing care are essential for achieving favourable neurological outcomes. [1]**

Case Presentation: A 32-year-old married woman came in with a complaint of progressive neck pain that had been ongoing for six years, headache for two years, and acute vomiting, diplopia, progressive lower limb weakness, gait imbalance, and inability to walk for one week before admission. On examination, she was alert and oriented with normal vital signs, but with bilateral lower-limb weakness, decreased tendon reflexes, and diplopia. A CT cranial angiography showed a large posterior fossa mass that extends into the foramen magnum, typical of a vascular foramen magnum meningioma fed by the right posterior inferior cerebellar artery. The patient underwent a post-suboccipital craniotomy wherein a large tumour was successfully removed with a gross total resection. The patient was managed in the intensive care unit with post-operative interventions including ventilation, neurologic monitoring, analgesia, anticonvulsants, corticosteroids, antibiotics, feeding, and nursing.

Outcome: The patient's postoperative neurological condition progressively improved. She was successfully weaned from ventilatory support, gradually resumed oral intake, participated in early mobilization, and demonstrated stabilization of neurological status during hospitalization.

Conclusion: This case was educational because it demonstrated the importance of considering chronic symptoms of cervicomedullary dements as a warning sign for foramen meningioma. The timely intervention, including neuroimaging, multidisciplinary surgery, and nursing care, allowed for a successful outcome. The case also underlines the importance of early diagnosis to reduce neurological dysfunction and improve the patient's quality of life following the surgery.

***Index Terms*—Foramen magnum meningioma; posterior fossa tumour; craniovertebral junction; neurosurgery; case report; nursing care; craniotomy.**

I. INTRODUCTION

Foramen magnum meningioma (FMM) is a rare subtype of meningioma arising from arachnoid cap cells surrounding the dura of the foramen magnum. Although histologically benign in most patients, its strategic anatomical location makes it one of the most surgically challenging tumours encountered in neurosurgical practice. The tumour develops adjacent to vital neurovascular structures, including the medulla oblongata, vertebral arteries, posterior inferior cerebellar artery (PICA), lower cranial nerves (IX–XII), and upper cervical spinal cord. Consequently, even relatively small lesions may produce profound neurological deficits through compression of these structures.[2]

FMMs account for approximately 2.2–2.5% of intracranial meningiomas and approximately 6–7% of tumours involving the craniovertebral junction. They occur predominantly in women during the fourth to sixth decades of life; however, younger adults may also be affected. Because tumour growth is generally slow, symptoms often evolve insidiously over several years before diagnosis.[3]

Clinical manifestations are determined by the tumour size and direction of growth. The initial symptoms are

usually occipital headache and neck pain that are persistent. The progression of the tumour leads to the compression of the cervicomedullary junction, resulting in limb weakness, ataxia, dyscoordinated gait, sensory loss, cranial nerve deficits, dysphagia, diplopia, and respiratory insufficiency. Due to the broad range of vague presentations, the condition may be misdiagnosed as cervical spondylosis, vestibular disorders, or migraine.

Magnetic resonance imaging with gadolinium remains the gold standard for diagnosis, whereas CT angiography assists in delineating vascular anatomy and planning surgical approaches. Complete microsurgical excision remains the preferred treatment whenever anatomically feasible. Advances in skull-base approaches, intraoperative neurophysiological monitoring, microsurgical instrumentation, and neuroanesthesia have significantly improved postoperative neurological recovery while reducing morbidity.

Comprehensive perioperative nursing care plays a crucial role in optimizing outcomes. Continuous neurological assessment, airway maintenance, pain management, prevention of raised intracranial pressure, seizure precautions, infection prevention, nutritional support, pressure injury prevention, early mobilization, and psychosocial counselling contribute substantially to postoperative recovery and rehabilitation.[4]

The present case study discusses a young female patient who suffered from a foramen magnum meningioma and was successfully treated through surgery. The case highlights the importance of nursing care and the patient's own actions in contributing to the positive outcome.

II. CASE PRESENTATION

A 32-year-old married female patient came to the neurosurgical ward with a complaint of neck pain for the past six years and headaches that occurred intermittently for two years. The patient's condition started deteriorating within the last week after she began experiencing vomiting episodes, double vision, weakness of the legs, imbalance while walking, and she was no longer able to walk. The patient came to the hospital for further evaluation due to the development of her condition and loss of motor skills. The patient's previous treatment included conservative therapy for chronic neck pain and headache without a precise diagnosis. The patient does not have a history of hypertension, diabetes, tuberculosis, epilepsy, trauma, alcohol abuse, or smoking. The patient does not have a family history of neurological diseases. The patient's family members have enough support during her treatment.

Upon arrival to the hospital, the patient was alert, oriented, and cooperative. The patient's temperature was 36.9 C°, heart rate was 98 beats per minute, respiratory rate was 20 per minute, blood pressure was 110/70 mm/Hg, and oxygen saturation was 97% on room air. The patient presented with diplopia, weak legs, inability to walk, and decreased reflexes. Upon a neurological assessment, cranial nerves IX and X were decreased; there was involvement of the second cranial nerve, leading to diplopia, decreased reflexes in the upper limbs, overall decreased motor power in the legs, and the patient was unable to stand or walk independently. The remaining cranial nerves were intact. The patient was generally well-developed and well-nourished and did not display any abnormalities in cardiovascular, respiratory, abdominal, and genitourinary examinations.

III. DIAGNOSTIC ASSESSMENT

The patient underwent a comprehensive clinical evaluation, laboratory investigations, and neuroimaging to determine the cause of her progressive neurological deficits. Clinical examination demonstrated persistent neck pain, occipital headache, diplopia, gait imbalance, bilateral lower-limb weakness, and inability to ambulate independently. Neurological examination revealed diminished lower-limb reflexes and impairment of the optic and accessory cranial nerves, indicating involvement of the cervicomedullary junction.

Routine haematological investigations demonstrated normal haemoglobin and platelet count with neutrophilia and lymphopenia, suggestive of physiological stress. Renal and hepatic function tests were within acceptable limits for major neurosurgical intervention. Electrolytes revealed mild hyponatremia without clinically significant metabolic derangement. Urinalysis showed mild proteinuria and microscopic haematuria.

CT cranial angiography demonstrated a well-defined predominantly solid posterior fossa mass extending into the foramen magnum. The lesion compressed the cerebellar vermis superiorly and was supplied predominantly by the right posterior inferior cerebellar artery (PICA), findings compatible with a vascular foramen magnum meningioma. No associated aneurysm or arteriovenous malformation was identified.

Following surgery, non-contrast CT of the head demonstrated expected postoperative changes following suboccipital craniotomy, including small intracranial air pockets and mild subdural hygroma without evidence of residual tumor, acute hemorrhage, or significant postoperative intracranial hypertension. Mild compression of the fourth ventricle persisted without obstructive hydrocephalus.

IV. SURGICAL MANAGEMENT

Considering the patient's rapidly progressive neurological deterioration, definitive surgical intervention was indicated. She underwent **post-**suboccipital craniotomy with complete excision of the tumour under general anesthesia. The primary surgical objective was complete tumour removal while preserving the brainstem, vertebral arteries, lower cranial nerves, and surrounding neurovascular structures.

Following surgery, the patient was transferred to the intensive care unit for close neurological monitoring. Mechanical ventilation was maintained initially because of the complexity of posterior fossa surgery. Standard postoperative management included corticosteroid therapy to reduce cerebral edema, anticonvulsant prophylaxis, broad-spectrum antibiotics, analgesics, antiemetics, gastric protection, intravenous fluids, and electrolyte correction. Progressive neurological improvement permitted gradual ventilator weaning, initiation of enteral nutrition, assisted mobilization, and transfer toward rehabilitation.

V. NURSING MANAGEMENT

Perioperative nursing care focused on neurologic functions, prevention of complications, promotion of normal functions, and psychosocial support.

Preoperative Nursing Care: Neurologic state, including the Glasgow scale, cranial nerves, strength, sensation, gait, and vital signs were frequently assessed. The degree of pain was regularly evaluated and reduced by appropriate analgesics. Preoperative anxiety was reduced by effective communication and explanation to the patient and their families about the upcoming surgery. Intravenous access was provided with special attention to aseptic techniques.

Immediate Postoperative Nursing Care: The patient's priority nursing interventions following surgery included neurological monitoring, maintenance of airway, ventilator, and monitoring of intracranial pressure, intake and output, hemodynamics, and prevention of seizures. Additionally, the nursing professional took care of patient comfort, infection control, prevention of pressure ulcers, central line, Foley catheter care, mouth care, and feeding through a Ryle's tube according to the established hospital policies and procedures.

Rehabilitation Nursing: The main priorities during the period of rehabilitation include progression of function, prevention of deep vein thrombosis, breathing exercises, nutritional support, upper limb functional training, assisted ambulation, patient education, and counseling for discharge. Patients' psychological state, families involvement, and education are also of great importance.

VI. DISCUSSION

Foramen magnum meningiomas remain among the most technically demanding benign intracranial tumours because of their intimate relationship with the medulla oblongata, vertebral arteries, cranial nerves IX–XII, and upper cervical spinal cord. Their slow growth often results in prolonged symptom duration before diagnosis, as demonstrated by this patient, who experienced chronic neck pain for six years and headache for two years before developing rapidly progressive neurological deficits.[5]

The lesion is often large when discovered because of their slow-growing rate, their indolent development, the difficulty of the diagnosis leading to a long interval since the first symptom, and the wide subarachnoid space at this level. The clinical presentation of FMM is protean, and the mean length of symptoms prior to diagnosis is 30.8 months, even in the era of MRI. Trauma to the head or neck occasionally caused these

tumours to manifest themselves before they otherwise would have been detected. Indeed, prior to the advent of advanced imaging technologies, patients with FM tumours were frequently misdiagnosed with a variety of disorders including multiple sclerosis, cervical spondylosis, a herniated cervical disk and amyotrophic lateral sclerosis because of the uncommon symptoms caused by the anterior location of the lesion. Signs and symptoms presented at admission are unusual, atypical, slowly progressing, and, often, remitting.[5]
The patient's clinical presentation of headache in the occipital region, neck pain, gait disturbance, diplopia, and lower-limb weakness is typical for cervicomedullary compression. Long motor tracts are compressed, resulting in weakness, while cranial nerves are involved, accounting for diplopia and gait imbalance.

The diagnostic imaging modality that should be undertaken for this patient is neuroimaging. The CT angiography performed in this patient visualized the distribution of the vessels, specifically the posterior inferior cerebellar artery, which helps determine the surgery. The treatment of choice for such cases is total resection of the tumour if feasible because it reduces the risk of deterioration and contributes to the best functional recovery.
The post-operative period is equally crucial to a successful outcome. Neurological function must be closely monitored during the first 48 hours, and special attention should be paid to the airway patency. Additionally, optimal post-craniotomy care includes glucocorticoid therapy, prevention of seizures, and infections. Patients benefit from early mobilization and rehabilitation to prevent deep vein thrombosis, pulmonary complications, and atrophy of limb muscles. Overall, post-operative management plays the critical role of minimizing the risk of morbidity, accelerating functional recovery, and improving the quality of life after surgery.

This case indicates the importance of professional assistance provided by nursing practitioners in preoperative, intraoperative, and postoperative stages. Specialized assessment of neurological signs, timely detection of potential complications, and the implementation of appropriate treatment and postoperative instructions had a favourable impact on the outcome.

VII. CONCLUSION

This case demonstrates the importance of recognizing persistent cervico-occipital pain accompanied by progressive neurological symptoms as possible indicators of foramen magnum pathology. Early neuroimaging, timely neurosurgical intervention, and multidisciplinary perioperative care resulted in satisfactory neurological recovery. Comprehensive nursing management played a pivotal role in maintaining neurological stability, preventing postoperative complications, promoting rehabilitation, and improving functional outcomes. Increased awareness of this uncommon tumour may facilitate earlier diagnosis and reduce long-term neurological disability.

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