Ganglioneuromas are considered to be part of the neuroblastoma series of tumors, which evolve from the sympathogonia of neural crest origin. As imaging techniques have become more widely practiced, the number of ganglioneuromas detected incidentally has increased. Preoperative diagnosis of retroperitoneal ganglioneuromas is often difficult and the diagnosis is usually based on histopathological findings after surgical excision of the tumor. We present two cases of this unique disease entity and discuss its clinical presentation, therapeutic approach, and clinical outcome.

1. Introduction

Ganglioneuromas are fully differentiated and typically nonmetabolically active tumors of the sympathetic nervous system. They are considered to be part of the neuroblastoma series of tumors that includes neuroblastomas and ganglioneuroblastomas, which evolve from the sympathogonia of neural crest origin.1 These tumors occur in all age groups but are more common in children above the age of 10 years.2 Most ganglioneuromas are asymptomatic and are found incidentally and with similar frequencies in both sexes. Ganglioneuromas are relatively difficult to distinguish from other tumors because of the lack of specific imaging findings.3 As imaging techniques such as computed tomography (CT) and ultrasonography have become more widely practiced, the number of ganglioneuromas detected incidentally has increased. However, it is difficult to make an accurate preoperative diagnosis of ganglioneuroma.4 Early detection is important, however, because complete resection results in a cure and the tumor rarely undergoes malignant transformation.5

Most studies of retroperitoneal ganglioneuromas have been limited to case reports or case series consisting of small numbers of cases. This study describes a further two cases of this relatively uncommon disease entity.

2. Patients and Methods

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institutional board approval from January 2000 to January 2008. Admission and discharge records were reviewed and examined for patients diagnosed with ganglioneuromas. Two patients were identified and their complete clinical and pathologic data were obtained.

3. Case Reports

3.1. Case 1

A 5-year-old female patient presented to our department in 2005 with a suspect renal mass discovered accidentally by ultrasonography by her family doctor. Ultrasound revealed a homogeneous mass with well-defined borders, detected at the left apical pole. Magnetic resonance imaging (MRI) revealed a paravertebral mass measuring 5.2 cm × 4.1 cm, anterior to the left kidney and infiltrating the neural foramen on the left side (Figure 1). This mass partly displaced the psoas muscle at the level of T12/L1 and was poorly defined on the images. There was no suggestion of lymph node involvement. A preoperative diagnosis of retroperitoneal neuroblastoma was made and surgical resection was performed.

A midline laparotomy was made for laterocolic extirpation of the mass, sparing the residual left kidney. The lateral portion was mobilized and removed, with renal vessel preservation. The extension of the mass into the psoas muscle, the spinal canal at the level of L1 and the ganglionic area made complete resection impossible. Frozen sections showed the mass to be grossly and histologically compatible with ganglioneuroma (Figures 2 and 3). In order to avoid injury of the spinal canal, the decision was made to perform a secondary operation. Postoperative histologic examination revealed a mixture of immature and mature ganglion fibers and neuronal cells that were outside the renal capsule, suggestive of retroperitoneal ganglioneuroma with sparing of the renal parenchyma.

After interdisciplinary consultations with pediatric surgeons and neurosurgeons, and due to the possibility of paraplegia caused by progressive tumor growth, the patient was scheduled for radical resection.

Figure 1 Abdominal magnetic resonance imaging of a 5-year-old female patient revealing a paravertebral mass measuring 5.2 cm × 4.1 cm, anterior to the left kidney and infiltrating the neural foramen on the left side, thought to be a retroperitoneal ganglioneuroma.

Figure 2 Gross appearance of a 5.2-cm × 4.1-cm encapsulated mass of firm consistency with a homogenous, solid, grayish-white cut surface, histologically confirmed to be a retroperitoneal ganglioneuroma.

Figure 3 Histological appearance of a spindle cell tumor with fascicles composed of neuritic processes, Schwann cells, perineural cells and ganglion cells compatible with that of a primary ganglioneuroma.
Ganglioneuromas are typically slow growing, benign tumors with a tendency to remain clinically silent for a considerable period. Preoperative diagnosis of retroperitoneal ganglioneuromas is often difficult, and the diagnosis is usually based on histopathologic findings after surgical excision of the tumor. To date, there have been only four case reports describing cytologic diagnosis of ganglioneuromas by fine-needle aspiration biopsy cytology. Although fine-needle aspiration cytology has been reported to be useful in the preoperative diagnosis of adrenal ganglioneuroma in some cases, the tumoral tissue can contain fractions of less well-differentiated areas, and surgical exploration is therefore required to achieve a definitive diagnosis and risk assessment.

Ganglioneuromas can occur spontaneously, as a result of the necrosis of immature neuroblasts from malignant neuroblastomas at primary or metastatic sites, or during either chemotherapy or radiation therapy for neuroblastomas. 

Symptomatic ganglioneuromas are rare, and symptoms mostly result from compression of the surrounding structures by the mass. Abdominal tumors may lead to abdominal pain, vomiting, constipation, weight loss, and walking pain. Additionally, symptoms of autonomic dysfunction have been encountered in patients with hormone-secreting ganglioneuromas. Such symptoms have also been noted in patients with paravertebral ganglioneuromas that compressed the autonomic fibers of the lumbosacral plexus. Furthermore, functional ganglioneuromas that were found to release peptides such as vasoactive intestinal peptide, somatostatins and neuropeptide Y have been documented in the literature. Ganglioneuromas are most often located in the posterior mediastinum, followed by the retroperitoneum and cervical region. Other sites of occurrence include the gastrointestinal tract, parapharyngeal area, bone, and supraclavicular area. Rarely, ganglioneuromas are encountered in the heart or even the spermatic cord. Diffuse ganglioneuromatosis affecting any part of the gastrointestinal tract has also been described, and may be associated with neurofibromatosis or the syndrome of multiple endocrine neoplasia type IIB. A rare case of a solitary cutaneous ganglioneuroma has also been reported.

The differential diagnosis of ganglioneuroma includes neuroblastoma, ganglioneuroblastoma, neurofibroma, schwannoma, adrenal adenoma, adrenocortical carcinoma, and pheochromocytoma.

Grossly, the tumors consist of large, encapsulated masses with a firm consistency and a homogenous, solid, grayish-white cut surface. Microscopically, ganglioneuromas can be divided into two subtypes: The mature subtype includes spindle cell tumors resembling neuroblastomas but with fascicles composed of neuritic processes, Schwann cells, and perineural cells and showing numerous ganglion cells; the maturing subtype has a similar stroma, but with ganglion cells in different stages of maturation, from fully mature cells to neuroblasts.

As imaging techniques such as CT and ultrasonography have become more widely practiced, the number of ganglioneuromas detected incidentally has increased. Ultrasonography usually reveals a homogeneous, hypoechoicogenic mass with well-defined borders, while CT usually reveals a well-defined mass with an oval shape, which tends to surround major blood vessels. The tumor is usually homogeneous with relatively low attenuation, less than that of muscle and slightly enhanced by contrast medium.

MRI using standard echo T1-weighted and T2-weighted images, as well as in- and out-phase chemical shift imaging, shows ganglioneuromas as homogeneous masses with a signal intensity less...
than that of liver on T1-weighted MRI, and as heterogeneous masses with a predominant signal intensity greater than that of liver on T2-weighted MRI. It shows no absolute change in signal intensity on chemical shift imaging. Dynamic studies demonstrate the same enhancement pattern as that seen using CT. The management of ganglioneuromas is mainly by surgical resection, which can be either radical or staged. Due to its close relations to large vessels, some potentially life-threatening complications can arise during surgical resection. Surgery should be performed under the following circumstances: Possibility of progression and recurrence, recurrence of neuroblastoma from ganglioneuroma, symptoms resulting from the tumor, encroachment on vertebral foramina, marked growth in size, and increased secretion of catecholamine.

Preoperative or postoperative chemotherapy and radiotherapy are of no value, and such modalities are not only unnecessary in these patients, but can also cause side effects and may be associated with secondary malignancies at the tumor site after radiotherapy. Most patients experience prolonged survival, without any evidence of progression. However, the possibility of slow progression and late recurrence of ganglioneuromas cannot be excluded. Furthermore, the probability of recurrence of neuroblastoma from the ganglioneuroma is unknown. Hayes et al reported that removal of an abdominal ganglioneuroma with the surrounding lymph nodes revealed another ganglioneuroma in one of the lymph nodes. Kulkarni et al noted late malignant transformation of a dormant ganglioneuroma. Drago et al reported on the spontaneous development of a malignant peripheral nerve sheath tumor in a benign ganglioneuroma in an 11-year-old girl. Long-term postoperative follow-up is therefore necessary to assess the malignant potential of these tumors. If any progression of the tumor is suspected during follow-up, re-biopsy or laparotomy may be indicated.

References