Abstract

Introduction: Pineal region is a deep-seated part of the brain surrounded by highly eloquent structures. Differential diagnosis of space-occupying lesions in this region encompasses pineal gland cysts, pineal gland tumours, metastases, germ cell tumours, meningiomas, gliomas, hemangioblastomas and neuroectodermal tumours. In this thesis, I focused mainly on patients with pineal cysts, which is a benign affection of the human pineal gland on the borderline between pathology and normality. The clinical management of patients with a pineal cyst remains controversial, especially when patients present with non-specific symptoms. A melatonin secretion in patients with a pineal cyst before and after a pineal cyst resection has not been studied yet and the effect of surgery on human metabolism is unknown.
Materials and Methods: We performed a prospective study between 2000 and 2016. All patients with a pineal cyst larger than 7 mm were included. Epidemiological data, presenting symptoms, surgical results and radiographic and clinical follow-up were documented. We examined melatonin, cortisol and blood glucose secretion profiles perioperatively in a subgroup of 4 patients. The control group was represented by 3 asymptomatic patients with a pineal cyst. For each patient, 24-h circadian secretion curves of melatonin, cortisol and glycemia were acquired. We used an online questionnaire to gather expert opinions on clinical management of patients with pineal cysts from neurosurgeons worldwide.
Results: A total of 110 patients were enrolled. The most common presenting symptoms were tension headache, vertigo, migraine, syncope, nausea and diplopia. Symptoms worsened during the follow-up period in 17 patients, improved in 13 patients and remained stable in 80 patients. The mean follow-up was 79.2 months. A pineal cyst increased in size during the follow-up in 6 patients and decreased in size in 9 patients. Twenty-one patients underwent pineal cyst resection; 20 patients reported some improvement in their presenting symptoms and 10 patients were symptom free after the surgery. An analysis of melatonin profiles showed an expected diurnal pattern with the night peak in patients before the surgery and in the control group. In contrast, melatonin levels in patients after the surgery were at their minimum throughout the whole 24-h period. The cortisol secretion was substantially increased in patients after the surgery.
Conclusion: This thesis presents the largest clinical series of patients with pineal cysts. Surgery, if indicated properly, is a legitimate treatment modality for symptomatic patients with satisfactory results. Relief of symptoms, even non-specific ones, was achieved in the majority of cases. Patients with a pineal cyst preserved the physiological secretion of the hormone melatonin while patients who underwent the pineal cyst resection experienced a loss of endogenous pineal melatonin production, which equated with pinealectomy. Surprisingly, cortisol secretion substantially increased in patients after the surgery. The survey shed light on the current practice of pineal cyst management across the world.