Clinical Neurology and Neurosurgery 124 (2014) 66–71

Contents lists available at ScienceDirect

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro

Pituitary abscess following transsphenoidal surgery: The experience of 12 cases from a single institution

Lei Wang [a,b], Yong Yao [a], Feng Feng [c], Kan Deng [a], Wei Lian [a], Guilin Li [a], Renzhi Wang [a], Bing Xing [a,*]

[a] Department of Neurosurgery, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100730, China
[b] Peking University Wu-Jieping Urology Center, Peking University Shougang Hospital, Peking University Health Science Center, Beijing 100144, China
[c] Department of Radiology, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100730, China

ARTICLE INFO

Article history:
Received 6 January 2014
Received in revised form 20 June 2014
Accepted 22 June 2014
Available online 1 July 2014

Keywords:
Pituitary
Abscess
Adenoma
Hypopituitarism
Transsphenoidal surgery

ABSTRACT

Objective: To explore possible reasons for the incidence of a pituitary abscess following transsphenoidal surgery and determine the most effective treatment.
Methods: A series of 12 patients who had undergone transsphenoidal surgery in other hospitals before being treated at Peking Union Medical College Hospital were reviewed. The presence of a pituitary abscess was confirmed when pus was intraoperatively observed within the sella turcica. All patients were treated with debridement of the abscess, nine among whom through a transsphenoidal approach and the other three via a craniotomy, followed by antibiotic treatment and hormone replacement therapy. The mean follow-up time was 27.0 months (range from 3.0 to 79.0 months).
Results: Headache (92%), panhypopituitarism (58%) and visual disturbance (50%) were the most common clinical indicators of a pituitary abscess. Imaging tests demonstrated a pituitary mass in all patients, with seven (58%) manifested with typical magnetic resonance features of an abscess. Ten patients (83%) were correctly diagnosed preoperatively. During surgical exploration, six presented with severe inflammation or an abscess within the sphenoidal sinus. Causative organisms were identified in five patients (42%). After surgical and antibiotic therapies, all patients fully recovered except for two presenting with severe visual impairment. Six patients (50%) required hormone replacement therapy.
Conclusion: Retrograde infection from the sphenoid sinus may be a vital mechanism underlying the formation of a pituitary abscess following transsphenoidal surgery. Debridement of the abscess through surgical approaches combined with antibiotic treatment has been found to yield positive outcomes.

1. Introduction

Transsphenoidal surgery (TS) has become the first choice for the surgical management of sellar masses. Though the safety and efficacy of TS have been widely recognized, it may lead to severe complications, such as development of a pituitary abscess (PA).

PA is a rare inflammatory disorder in the sellar region, representing <1% of all cases of pituitary diseases referred to the specialists. Most PAs are primary and occur without any explicit cause. Approximately 1/3 of PAs are secondary, arising from pre-existing lesions in the pituitary region [1–3], such as pituitary adenomas [2], Rathke's cleft cysts [4] and craniopharyngiomas [5]. The development of a PA following TS is extremely rare. Only a few studies have reported such diseases [3,10–14], and most were presented as individual reports.

In this paper, we presented a retrospective review of 12 cases developing PA after undergoing TS at our institution. To our knowledge, this is the largest clinical trial including PA cases following TS.

2. Patients and methods

This retrospective review included a total of 12 consecutive patients treated for a PA following TS at our institution between January 2003 and May 2013. All patients presented with secondary

Abbreviations: CSF, cerebrospinal fluid; GH, growth hormone; MR, magnetic resonance; MRSA, methicillin-resistant *Staphylococcus aureus*; MRSE, methicillin-resistant *Staphylococcus epidermidis*; PA, pituitary abscess; PUMCH, Peking Union Medical College Hospital; TS, transsphenoidal surgery.

* Corresponding author at: Department of Neurosurgery, Chinese Academy of Medical Sciences and Peking Union Medical College, 1# Shuaifuyuan, Dongdan, Beijing 100144, China. Tel.: +86 10 69152530; fax: +86 10 69152530.
E-mail address: docxingbing@126.com (B. Xing).

http://dx.doi.org/10.1016/j.clineuro.2014.06.028
0303-8467/

PA after undergoing TS in other local hospitals prior to admission to our institution. Among 12 patients, five were male and seven were female, aged 41.3 years on average (range: 19.0–67.0 years), as shown in Table 1. The diagnosis of a secondary PA could be confirmed if the following two criteria were met: (1) a cystic mass containing pus was encountered during surgical exploration of the sella turcica; and (2) there was evidence of acute or chronic inflammation in a specimen obtained intraoperatively.

All patients received general physical and neurological examinations. Complete medical records were obtained and much attention was paid to identifying the possibility of active infection. Endocrine functions of the pituitary were evaluated and magnetic resonance imaging (MRI) was conducted preoperatively, postoperatively and during follow-up (Fig. 1). Any patients presenting with visual abnormalities also underwent full ophthalmologic evaluations.

The first follow-up was performed in all patients within 1-month after discharge, followed by another two follow-ups at 4- to 6- and 12-month after discharge, respectively. Subsequently, reviews were performed every 1–2 years depending upon the recovery of patients. The reviews included assessing treatment outcomes, neurological and biochemical examinations and MRI. The mean follow-up time was 27.0 months and ranged from 3.0 to 79.0 months (Table 1).

This study was approved by the Ethnics Committee of Peking Union Medical College Hospital and written consent was obtained from all subjects. This study was performed with strict adherence to the Declaration of Helsinki.

3. Results

3.1. Symptoms and signs

Headache (92%) was the most common complaint in 11 patients, but the patterns of headache were not specific and headache pain varied from mild to severe degree. Seven patients (58%) were diagnosed with panhypopituitarism based on biochemical endocrine function tests and clinical manifestations, presenting with symptoms, such as amenorrhea, weakness, cold sensitivity, anorexia, nausea and vomiting (Table 1). Six patients (50%) complained of visual disturbances, showing changes in either visual acuity or visual field. Two patients suffered from unilateral loss of vision. In our series, only five patients (42%) presented with fever, and the peripheral white blood cell count was elevated in only one case. Two patients (17%) complained of diabetes insipidus. Growth hormone (GH) levels were high in three patients who had a PA concurrent with a recurrent GH adenoma.

3.2. MRI

MR scanning demonstrated a pituitary mass in all patients. The masses were either cystic or partially cystic with an average diameter of 1.9 cm (range: 1.1–2.9 cm). Seven (58%) intrasellar masses exhibited typical features of an abscess, including the presence of a sellar cystic or partially cystic mass that appeared hypointense or isointense upon T1-weighted (T1WI) imaging and hyperintense or isointense upon T2-weighted (T2WI) imaging, with an enhanced rim following gadolinium injection. The remaining masses displayed inhomogeneous signal intensities under T1WI and T2WI, with uneven or heterogeneous enhancement. Abnormal signals or cystic masses were found in the suprasellar regions or the frontal lobes of three patients, who presented with a scatteredly enhanced mass or a soft tissue signal with heterogeneous enhancement. In one typical case with aspergillus infection (Case No. 9), a cystic mass was found on the right frontal lobe with an obviously enhanced rim.

3.3. Accuracy of preoperative diagnosis

Given the history of previous TS surgery, clinical symptoms of panhypopituitarism and typical imaging findings, 10 of the 12 patients (83%) were correctly diagnosed with or highly suspected of having a secondary PA prior to surgical treatment. Two other patients (Cases No. 7 and 8) were misdiagnosed with a recurrent pituitary adenoma due to ambiguous clinical features and imaging findings.

3.4. Surgical approach and antibiotic treatments

These 12 patients underwent a total of 20 operations at our institution, with transsphenoidal approach in 16 operations, craniotomy in three operations and ventriculoperitoneal shunt operation in one case (Table 1). One patient (Case No. 2) underwent a total of five operations, including a craniotomy for an intrasellar and intracranial abscess, three TS operations for an abscess in the sphenoidal sinus and one ventriculoperitoneal shunt operation due to hydrocephalus. As part of our routine preparations, all patients with a suspected diagnosis of PA received oral antibiotic pills (cephalosporins) for at least three days and were administered with antibiotics and hydrocortisone (200 mg) via intravenous route 30 min before surgery. Following surgery, all patients were treated with intravenous antibiotic therapy for 1–2 weeks, followed by oral antibiotics for 2–4 weeks, according to drug sensitivity tests or empirical usage.

3.5. Detailed operative procedures

During surgical management associated with the debridement of a PA, numerous detailed operative procedures were followed. (1) Once pus was encountered, careful attention was paid to protect the arachnoid of the diaphragma sellae and to avoid the leakage of the cerebrospinal fluid (CSF). Any pus wall near the sellar floor was resected, but only those below the sellar diaphragm were reserved. (2) The pus was aspirated sufficiently, and the vomica was irrigated repeatedly with hydrogen peroxide, povidone iodine and saline; however, the irrigation pressure was not very high. (3) The sella turcica and the sphenoid sinus were tightly packed with a tela iodoformum, with the frontal end placed intrasellarly and the rear end extracted between nasal mucosae. The tela iodoformum was removed five to seven days after the operation if no CSF leakage occurred. (4) The sellar floor was reconstructed with artificial duramater, thigh fascia or a vomer bone if CSF leakage occurred. (5) Upon the completion of abscess removal, the surgeon confirmed that the nasal cavities were packed bilaterally with absorbent gauze soaked with iodoform to reposition the cartilaginous septum and the mucosal flaps.

3.6. Inflammation and abscess in the sphenoidal sinus

Of the 12 patients enrolled in our series, 10 underwent abscess drainage through TS (including one patient who underwent TS after the craniotomy). Scar tissues were encountered in the sphenoidal sinus in all 10 of the TS patients due to a previous TS operation. Interestingly, inflammatory tissues and/or abscesses were widely observed (six patients, 60%) in the sphenoidal sinuses of patients in our series. Three patients (Cases No. 1, 5 and 11) manifested severe inflammation in the sphenoidal sinus, presenting with pathological inflammatory exudates, sphacelus and granulation tissue, chronic inflammatory cell infiltrates and periosteal and mucosal thickening. In three other patients (Cases No. 2, 7 and 8), pus was encountered when exploring the sphenoidal sinus intraoperatively, concurrently manifesting with an abscess in the sphenoidal sinus.