

Delayed Symptomatic Hyponatremia

Delayed [symptomatic hyponatremia](#) is a known phenomenon occurring > 3 days after [transsphenoidal surgery](#). This is a significant cause of post-operative emergency room visits and re-admissions.

Epidemiology

see [Delayed Symptomatic Hyponatremia Epidemiology](#).

Etiology

The development of [Delayed Symptomatic Hyponatremia](#) (DSH) after transsphenoidal surgery has been ascribed mostly to elevations in the secretion of [ADH](#) following mechanical manipulation of the [pituitary gland](#), or less frequently as a result of excessive urinary excretion of salt resulting in [cerebral salt wasting syndrome](#) (CSWS) ¹⁾.

Patients with [Cushing's disease](#) were at a significantly higher risk than other patients to experience DSH ^{2) 3)}.

Risk Factors

Patel et al., retrospectively reviewed a series of over 300 consecutive patients undergoing [endoscopic transsphenoidal](#) surgery and identified patients with [delayed symptomatic hyponatremia](#) as well as patient, tumor, and surgical characteristics. In addition, they recorded inpatient post-operative [sodium](#) and specific gravity values as well as treatment upon discharge. Univariate and multivariate analyses were carried out to identify predictors of delayed hyponatremia and stratify patients into risk groups.

They found that 15% of patients developed delayed hyponatremia and that this occurred most commonly on post-operative day 7. This accounted for more than half of re-admissions after this type of surgery. Female patients and patients needing fluid restriction or [fludrocortisone](#) upon discharge were more likely to develop delayed hyponatremia. Patients with post-operative [diabetes insipidus](#) were less likely to develop delayed [hyponatremia](#). Using ROC analysis they developed a score which reliably could stratify patients at risk for delayed hyponatremia.

They confirm the risk of delayed hyponatremia after [transsphenoidal surgery](#) and identify factors that are revealed before discharge to identify patients at higher risk of [delayed hyponatremia](#). These data may help identify patients who require treatment upon discharge and short interval follow up to avoid significant costs of [readmission](#) ⁴⁾.

Clinical features

Patients can present with a range of [symptoms](#), from minor [nausea](#), [vomiting](#) [headache](#) to [confusion](#), and in severe cases, [seizures](#) and [death](#) ⁵⁾.

Treatment

see [Hyponatremia treatment after transsphenoidal surgery](#).

Systematic review

A systematic search of the literature was conducted using MEDLINE/PUBMED, EMBASE, and Cochrane databases. Inclusion criteria were 1) case series with at least 10 cases reported, 2) adult patients who underwent eTSS or mTSS for pituitary tumors, and 3) reported occurrence of Delayed Symptomatic Hyponatremia (DSH) (defined as serum sodium level <135 mEq/L with associated symptoms) after postoperative day 3. Data were analyzed using CMA V.3 Statistical Software (2014).

Ten case series satisfied the inclusion criteria for a total of 2947 patients. Various factors including age, gender, cerebrospinal fluid leak, and tumor size were investigated as potential predictors of DSH. DSH event rates for both mTSS and eTSS fell between around 4 and 12 percent and included a variety of proposed predictors.

Age, gender, tumor size, rate of decline of blood sodium, and Cushing disease are potential predictors of DSH. By identifying patients at high risk for DSH, preventative efforts can be implemented in the perioperative setting to reduce the incidence of potentially catastrophic hyponatremia following transsphenoidal surgery ⁶⁾.

Case series

see [Delayed symptomatic hyponatremia case series](#).

1)

Kelly DF, Laws ER, Jr., Fossett D. Delayed hyponatremia after transsphenoidal surgery for pituitary neuroendocrine tumor. Report of nine cases. J Neurosurg. 1995;83(2):363-367.

2)

Hensen J, Henig A, Fahlbusch R, Meyer M, Boehnert M, Buchfelder M. Prevalence, predictors and patterns of postoperative polyuria and hyponatraemia in the immediate course after transsphenoidal surgery for pituitary neuroendocrine tumors. Clin Endocrinol (Oxf). 1999 Apr;50(4):431-9. PubMed PMID: 10468901.

3)

Sane T, Rantakari K, Poranen A, Tahtela R, Valimaki M, Pelkonen R. Hyponatremia after transsphenoidal surgery for pituitary tumors. The Journal of clinical endocrinology and metabolism. 1994;79(5):1395-1398.

4)

Patel KS, Shu Chen J, Yuan F, Attiah M, Wilson B, Wang MB, Bergsneider M, Kim W. Prediction of post-

operative delayed hyponatremia after endoscopic transsphenoidal surgery. Clin Neurol Neurosurg. 2019 May 13;182:87-91. doi: 10.1016/j.clineuro.2019.05.007. [Epub ahead of print] PubMed PMID: 31108341.

5)

Whitaker SJ, Meanock CI, Turner GF, et al. Fluid balance and secretion of antidiuretic hormone following transsphenoidal pituitary surgery. A preliminary series. Journal of neurosurgery. 1985;63(3):404-412.

6)

Cote DJ, Alzarea A, Acosta MA, Hulou MM, Huang KT, Almutairi H, Alharbi A, Zaidi HA, Algrani M, Alatawi A, Mekary RA, Smith TR. Predictors and Rates of Delayed Symptomatic Hyponatremia after Transsphenoidal Surgery: A Systematic Review. World Neurosurg. 2016 Apr;88:1-6. doi: 10.1016/j.wneu.2016.01.022. Epub 2016 Jan 22. PubMed PMID: 26805685.

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