EDITORIAL

Endoscopic sinus surgery in sinusitis-induced intracranial abscess: concepts and controversies

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IN this issue, Koizumi et al.⁴ have explored the largely uncharted territory of the role of endoscopic sinus surgery (ESS) in patients with sinusitis-induced intracranial abscess (SIIA) in clinical practice. Their study is a retrospective analysis of a Japanese nationwide administrative database. In the current scenario of limited literature on this subject (primarily in the form of small, retrospective, single-center case series and anecdotal case reports), this study adds substantially because of its large sample size, propensity-matched control, multicentric nature of the study population, and robust results. The authors concluded that ESS does not add substantially to a reduction in mortality, readmission rates, reoperation rates, or length of hospital stay in patients with SIIA requiring neurosurgical intervention.⁴ These conclusions are in contrast to some previously published reports^{2,5} and are supported by others.^{1,3}

Koizumi et al.⁴ investigated the association between outcomes in patients undergoing neurosurgical interventions for SIIA and an ESS performed within the same hospitalization. The study design was retrospective in nature, and data on the patients with SIIA were collected from a large administrative nationwide inpatient database over a period of 8 years. Patients with fungal sinusitis, orbital complications, immunodeficiency, diabetes mellitus, and malignant disease were excluded from their study as such patients are especially more likely to undergo ESS. The study population was divided into those with and those without neurosurgical intervention. Of the 255 patients who underwent neurosurgical intervention for SIIA, 104 patients were in the test group (with ESS) and the remaining 151 patients were in the control group (without ESS). Patient characteristics were similar in the two groups, suggesting their comparability. Propensity score-adjusted regression analysis was performed to ascertain the association between ESS performed within the same hospitalization and outcomes following neurosurgical intervention (mortality, blood transfusion, readmission, neurosurgical

reoperation, and length of hospital stay). The authors did not identify any significant benefit from simultaneous ESS in patients requiring neurosurgical intervention. Similar results were obtained in the subgroup analysis that further stratified patients into a brain abscess group and a subdural/epidural abscess group.

In the current antibiotic era, SIIA is rarely encountered in clinical practice. The incidence of SIIA varies depending on the climate, geographical location, and socioeconomic stratification, which is encountered more often in developing countries. SIIA carries a mortality risk of 0%–7% and a morbidity risk of 10%–25%.^{1–3,5} The most common patterns of SIIA in decreasing frequency are subdural empyema, intracerebral abscess, extradural abscess, meningitis, and, more rarely, sinus thrombosis. Intracranial spread of infective foci from the paranasal sinuses (PNSs) can result from either direct contiguous spread via bony defects/ostomyelitic bone or indirect hematogenous spread via thrombophlebitis of valveless diploic veins draining PNSs, leading to spread of infection by thrombus propagation or release of septic emboli.^{1–3,5} The latter is a much more common route seen in clinical practice, especially in the setting of acute rhinosinusitis (ARS). Adolescent males are most commonly affected by SIIA probably because of the formation of the PNSs in adolescence and a highly vascularized diploic venous system, more susceptible to indirect means of intracranial spread of infection.^{1–3,5} The radiological investigation of choice for patients with suspected SIIA is contrast-enhanced CT, primarily because it is easier to obtain in an emergency setting. However, gadolinium-enhanced MRI is complementary to CT in ascertaining potential complications of sinusitis.

Although there are no consistently acceptable management guidelines for SIIA, the three pillars of the management strategy include medical management with injectable broad-spectrum antibiotics, ESS for clearing PNS abscess, and neurosurgical intervention for intracranial abscess drainage.^{1–3,5} ESS is a standard practice in patients

with medically refractory chronic rhinosinusitis.¹ However, its role in ARS is controversial. ESS may be of some benefit in recurrent SIIA in those patients with ARS or subacute rhinosinusitis for isolating the offending microorganism and preventing further disease progression and in patients with direct spread of intracranial infection via a skull base bony defect.¹

Current literature on this issue is limited and divided, with no level I or II evidence. Studies by Gitomer et al.³ and DelGaudio et al.¹ support the findings of the Koizumi study, while the studies by Garin et al.² and Szyfter et al.⁵ refute the conclusions of Koizumi and colleagues. In a series of 71 pediatric patients with SIIA, Gitomer et al.³ did not identify any benefit from frontal sinus surgery (endoscopic, cranialization, or trephination) in preventing revision surgery after primary neurosurgical intervention, although the procedure did not add to the overall complication rate. Similarly, in a study of 23 patients with SIIA, DelGaudio et al.¹ concluded that ESS did not alter the need for neurosurgical intervention, which was ultimately required in the majority of cases, even for small lesions (< 1 cm). On the contrary, in a study of 17 pediatric patients with SIIA, Garin et al.² concluded that ESS plays a pivotal role in the management of pediatric SIIA, especially in children with small-volume epidural empyema surgically accessible via a transnasal route. These authors also observed that half of the positive bacteriological samples were harvested from the PNSs during the ESS. Similarly, in a study of 51 patients with SIIA, Szyfter et al.⁵ concluded that the simultaneous removal of inflammatory focal points in the PNS and intracranial cavity preceded by the implementation of broad-spectrum antibiotics continuously for 4 weeks is an effective treatment strategy with minimal iatrogenic burden to the patient.

Conclusions drawn from the study by Koizumi et al.⁴ benefit from the large sample size, use of propensity score-matched controls, multicentric nature of study population, and robust results. Additionally, the strengths of research based on large administrative databases include generalizability owing to diverse clinical settings, diverse patients, and diverse providers. It is especially beneficial in evaluating rare clinical conditions. On the contrary, apart from the limitations mentioned in the paper by Koizumi et al., large administrative data are prone to inadequate or incomplete data on potential confounding variables, limited information on the purpose of data entry and quality, and suboptimal clinical outcome measure documentation. Furthermore, such data are prone to clerical error, transfer bias, recording bias, and reporting bias. In the zest for finding truth, the conclusions drawn from such a data set needs to be judiciously dissected in an astute and just manner.

Conceptually, it is of paramount importance to under-

stand whether ESS alters the natural history and progression of SIIA from sinusitis, whether concurrent drainage of the PNS and intracranial abscess is the optimal strategy to manage patients with SIIA, and whether the decision-making process depends on the anatomical location of the intracranial abscess in relation to sinus disease. In view of the controversial ideologies reported in the current literature,^{1–5} the logical conclusion is to individualize the treatment plan based on the relative pros and cons of concurrent ESS and neurosurgical intervention in each instance. Until there is level I evidence from large prospective randomized controlled trials (RCTs), we may have to rely on retrospective analyses of such nationwide administrative databases to guide the decision-making process in clinical practice. Nonetheless, SIIA requires multimodal management involving neurosurgeons, ear, nose, and throat surgeons, infectiologists, and radiologists. Though the study by Koizumi et al.⁴ may be a guiding light in a sea of darkness, debate must go on, and collaborative efforts in the form of large, multicenter prospective registries or RCTs are required to truly ascertain the role of ESS in SIIA patients and resolve this controversy.

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Disclosures

The author reports no conflict of interest.

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