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# Laser interstitial thermal therapy compared with open resection for treating subependymal giant cell astrocytoma

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## Abstract

**Objective:** Subependymal giant cell astrocytomas (SEGAs) are WHO grade 1 tumors associated with tuberous sclerosis that classically arise from the ventricular wall near the caudate groove and foramen of Monro. Laser interstitial thermal therapy (LITT) is a minimally invasive surgical technique, which works by heating a stereotactically placed laser fiber to ablative temperatures under MRI thermometry monitoring. In this paper, the authors present LITT as a surgical alternative to open resection of SEGAs.

**Methods:** Twelve patients with SEGAs who underwent 16 procedures between 2007 and 2022 at a single institution were retrospectively reviewed. These patients underwent either open resection or LITT. Clinical data, imaging, recurrence rate, further treatments, and related complications were analyzed.

**Results:** Among the 16 procedures, 9 were open resection and 7 were LITT. An external ventricular drain was placed in 66% (6/9) of open procedures and 57.1% (4/7) of LITT cases. A septostomy was performed in 56% (5/9) of open procedures and 29% (2/7) of LITT cases. Complication rates were higher in open cases than in LITT procedures (44% vs 0%,  $p < 0.05$ ). Complications included hydrocephalus, transient venous ischemia, wound infection, and bone flap migration. The median length of hospital stay was 4 days (IQR 3.3-5.5 days) for open cases and 4 days (IQR 3.0-7.0 days) for LITT procedures. Recurrence or progression occurred after 3 open cases and 2 LITT cases (33% vs 33%,  $p = 0.803$ ). For the recurrences, 2 open cases underwent stereotactic radiosurgery, 1 open case underwent LITT, and 1 LITT case underwent repeat LITT. Among the LITT cases, only the patients with no decrease in tumor size by 6 months experienced tumor progression afterward. The 2 LITT cases with progression were the only ones with calcification present on preoperative imaging. The median follow-up times for cases assessed for progression were 8.4 years (IQR 3.8-14.4 years) for open resection and 3.9 years (IQR 3.4-5.1 years) for LITT.

**Conclusions:** The small size of this case series limits generalizability or adequate comparison of safety. However, this series adds to the literature supporting LITT as a less invasive surgical alternative to open resection of SEGAs and demonstrates that LITT has similar recurrence and/or progression rates to open resection. Additional studies with more data are necessary for comprehensive comparisons between open resection and LITT for treating SEGA.

**Keywords:** LITT; SEGA; laser interstitial thermal therapy; subependymal giant cell astrocytoma; tuberous sclerosis.

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