



Reporting Acute Side Effects of Gamma Knife Stereotactic Radiosurgery for Single or Multiple Brain Metastases

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Abstract

Background

Acute toxicity data for Gamma Knife radiosurgery (GKSRS) come mostly from East Asian and Western centres.

To our knowledge, this is the first systematic report from Pakistan.

Objective: to determine the frequency and grade of acute side effects after GKSRS.

Methods

76 consecutive patients, Aug 2025 – Apr 2026

Mean age 53 · breast 34%, lung 24%

Frame

1 fraction · n = 42

Mask

1, 3 or 5 fractions · n = 34

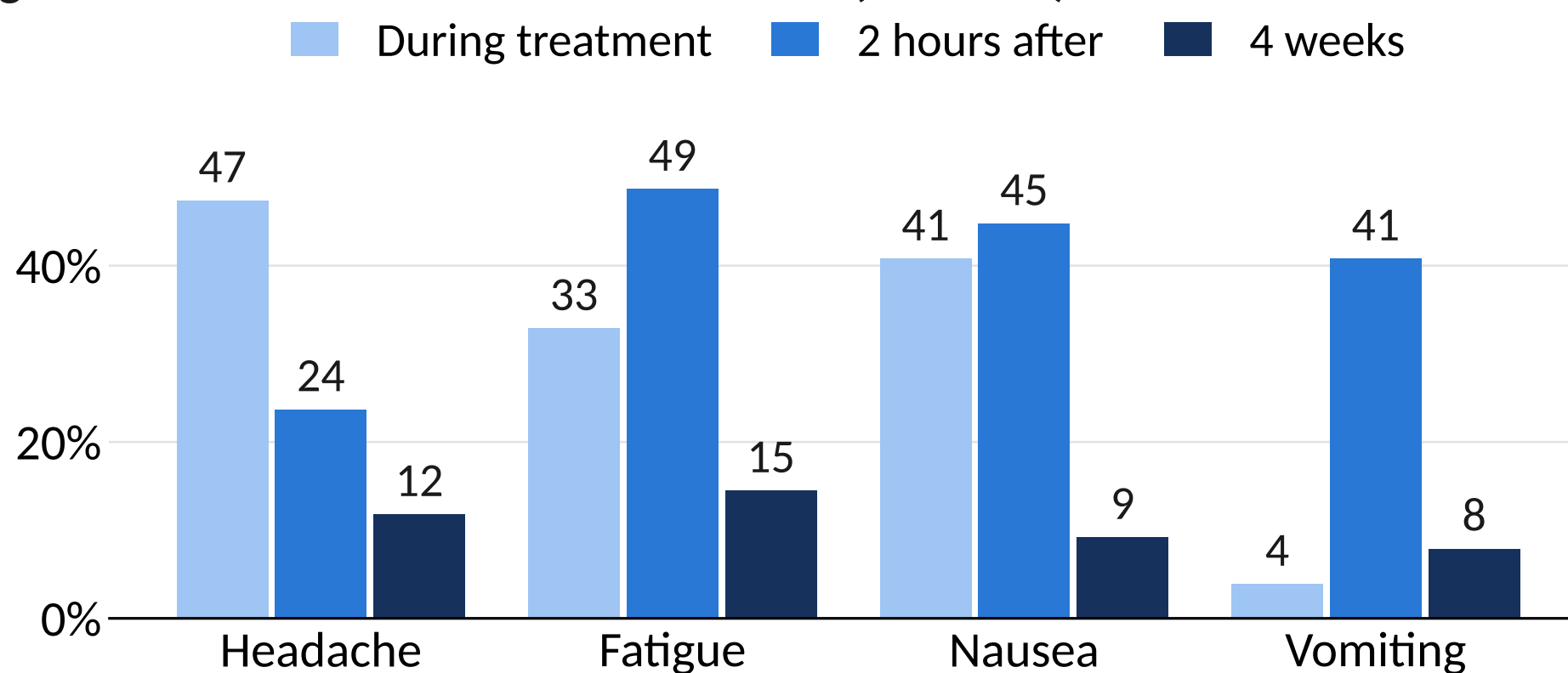
CTCAE v5.0 grading

during treatment → 2 hours → 4 weeks

Results

Acute side effects were mostly mild and eased within 4 weeks; single-fraction, frame-based treatment caused the most headache.

Figure 1. Patients with moderate or severe (Grade ≥ 2) side effects



0

Grade 4 or 5 events

$\leq 15\%$

had Grade ≥ 2 symptoms at 4 weeks

100%

of hair loss was Grade 1

What predicted worse symptoms?

Number of fractions (single worst) **p < 0.001**

Frame-based (vs frameless) **p < 0.001**

Higher dose per fraction **p < 0.001**

Age, gender, disease duration **NS**

Mainly headache and vomiting in the first 2 hours.

Limitations: single centre; fraction number and frame use overlap; 4-week follow-up.

Conclusion

GKSRS is a safe outpatient treatment for brain metastases. Give prophylactic analgesia, and consider antiemetics, before single-fraction frame-based treatment; fractionated mask-based treatment was better tolerated.

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