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INPLASY

Degree of trigeminal nerve root compression on MRI imaging in trigeminal neuralgia caused by tumors or basilar artery compression: protocol for a systematic review with descriptive synthesis

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Brisman, MH.

Corresponding author:
Michael Brisman

michaelbrisman@aol.com

Author Affiliation:
NSPC Brain and Spine Surgery.

ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - The corresponding author proposed the 0-4b trigeminal nerve compression grading scale applied in this review and is conducting a separate 15-case institutional series using the same scale. No financial conflicts of interest.

INPLASY registration number: INPLASY2026100056

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 October 2026 and was last updated on 18 November 2026.

INTRODUCTION

Review question / Objective PICOS: Population -- individual patients in published case reports, case series, or cohort studies with individual-level imaging data on trigeminal neuralgia attributed to tumor or basilar artery compression.
Exposure -- compression of the trigeminal nerve root by tumor or dolichoectatic basilar/ vertebrobasilar trunk.
Comparator -- none (single group descriptive review).
Outcome -- compression grade on the 0-4b scale
Study designs -- case reports, case series, cohort studies with individual-level data.
Primary question: in published cases or tumor or basilar artery attributed trigeminal neuralgia, what proportion of cases shows each grade of nerve root compression?

Rationale The literature invokes "neurovascular compression" as the mechanism of trigeminal neuralgia without a standardized severity scale, and mild nerve-vessel contact is common in asymptomatic nerve (e.g. Maarbjerg et al, Brain 2015: any contact 89% symptomatic vs 78% asymptomatic; severe contact 53% vs 13%). Binary "contact/no contact" grading cannot test whether a severity threshold separates pathogenic from incidental contact. Tumor and basilar artery cases represent the extreme end of the compression spectrum, making them the natural first test population for a proposed 0-4b compression grading scale. A systematic review applying this scale to the published cases tests whether trigeminal neuralgia in these etiologies is confined to severe compression grades and exposes how often the literature claims "compression" without defining or depicting it.

Condition being studied Trigeminal neuralgia (severe, unilateral, brief, electric-shock-like facial pain in trigeminal distribution) attributed by the original authors to tumor compression of the trigeminal nerve root (meningioma, schwannoma/ vestibular schwannoma, epidermoid, lipoma, other) or to compression by a dolichoectatic, ectatic, or tortuous basilar or vertebrobasilar trunk.

METHODS

Search strategy Pubmed/MEDLINE (E-utilities esearch), run 2026-10-09, 881 hits:
("Trigeminal neuralgia" [Mesh] OR "trigeminal neuralgia " [tiab] OR "tic douloureux" [tiab] AND ("meningioma" [Mesh] OR "Neurolemmoma"[Mesh] OR "epidermal cyst"[Mesh] OR "Basilar artery" [mesh] OR meningioma [tiab] OR schwannoma [tiab] OR "acoustic neuroma"[tiab] OR "vestibular schwannoma"[tiab] OR epidermoid [tiab] OR "basilar artery"[tiab] OR vertebrobasilar [tiab] OR dolichoectasia [tiab] OR dolichoectatic [tiab] OR ectasia [tiab]). Embase and Scopus: translated queries prepared (see embase-scopus-queries.md), run dates and hit counts to be recorded. No language, date, or study-design filters at search. Reference lists of included papers hand-searched.

Participant or population Individual patients of any age in published case reports, case series, or cohort studies reporting individual-level imaging of trigeminal neuralgia attributed to tumor or basilar artery compression.

Intervention Not applicable -- no intervention is evaluated in this review. The exposure of interest is compression of the trigeminal nerve root by tumor or by dolichoectatic basilar/vertebrobasilar trunk.

Comparator Not applicable -- single-group descriptive review; no comparator.

Study designs to be included Case reports, case series, and cohort studies reporting individual-level data.

Eligibility criteria Inclusion: (1) human case report, case series, or cohort study with individual level data; (2) trigeminal neuralgia attributed by the authors to the tumor compression of the trigeminal nerve root or to basilar/vertebrobasilar trunk compression (dolichoectatic, ectatic, or tortuous); (3) at least one published MRI figure depicting the trigeminal nerve and the compressing lesion, interpretable for grading.
Exclusion: (1) no published MRI figure adequate for direct grading (author descriptions alone are not sufficient; CT, schematics , or intraoperative photos cannot serve as the primary grading basis); (2) isolated AICA/SCA/PICA conflict without trunk dolichoectasia; (3) incidental tumor with no causal claim by the authors; (4) duplicate patients (counted once, earliest full report); (5) series that do not map MRI figures to individual patients (excluded from quantitative analysis; may be discussed narratively). Mixed tumor and vascular contact: included if the paper attributes TN to the tumor/basilar cause; coexistent vascular contact recorded as a modifier. No language restriction at search; papers included where figures/captions are interpretable.

Information sources Pubmed/MEDLINE, Embase and Scopus (electronic databases). Reference lists of included paper hand - searched. No author contact planned; no grey literature search.

Main outcome(s) Compression on the 0–4b scale, graded by a single expert reviewer (the guarantor) from published MRI figures (figure numbers recorded per case): 0 = no compression; 1 = simple contact; 2 = indentation/grooving without trajectory deviation; 3a = displacement (trajectory deviation ≤3 mm) away from the root entry zone; 3b = displacement at the root entry zone; 4a = distortion (trajectory deviation >3 mm); 4b = nerve nonvisualized due to mass effect (effacement/ encasement — not a technical imaging limitation; basis recorded per case). Encasement suffix 'e': appended to a base grade (0–4a) when the mass circumferentially surrounds a still-identifiable nerve over a segment of its course (e.g., 1e, 2e, 3ae); a descriptor, not a rank; not used with 4b.

Additional outcome(s) Cause type (tumor/ histology/ vessel involved), figure numbers supporting the grade, REZ site (proximal <= 3 mm/ distal/ unable), coexistent vascular contact (Y/N/ unclear), treatment received, pain outcome, follow up duration.

Data management Cause type (tumor/histology/ vessel involved), figure numbers supporting the grade, REZ site (proximal <= 3 mm/ distal/ unable), coexistent vascular contact (Y/N/unclear), treatment received, pain outcome, follow up duration.

Quality assessment / Risk of bias analysis Joanna Briggs Institute critical appraisal checklist for case reports;
Murad et al framework for case series.
Assessed per study and reported;
sensitivity analysis excluding high-risk-of-bias studies if numbers allow.

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Strategy of data synthesis Descriptive synthesis is primary: grade distribution (counts and proportions) across all gradable cases, with 3a/3b reported separately and 3- indeterminate as its own category. If >= 10 gradable cases, pooled proportions per grade via random-effects meta-analysis of proportions with 95% CI. Publication bias discussed explicitly: dramatic compressions are preferentially published, and papers with publishable MRI figures skew toward severe grades.

Subgroup analysis Tumor vs basilar-artery cases; grade distribution by lesion type/histology; grade x REZ - site cross-tabulation.

Sensitivity analysis (1) Excluding high-risk-of-bias studies, if numbers allow. (2) Excluding 3-indeterminate cases.

Language restriction None at search; inclusion requires interpretable figures/captions.

Country(ies) involved United States.

Other relevant information Amendment, 18 November 2026. (1) Encasement suffix 'e' added to the compression scale: appended to a base grade (0–4a) when the mass circumferentially surrounds a still-identifiable nerve over a segment; a descriptor, not a rank — threshold analyses use the base grade; not used with 4b (if the encased nerve cannot be identified, the grade remains 4b with encasement recorded as its basis). Rationale: circumferential compression can be substantial with no net displacement or deformity because the forces balance; a deformation-only scale does not record it. The suffix requires the published figure to make complete circumferential involvement certain (certainty-floor and figure-basis rules unchanged); partial wrapping is recorded in notes only. (2) Completion of the registered scale definition: the registered Main outcome(s) text omitted the definitions of grades 3b and 4a, which have been part of the scale since the investigator's 10 October 2026 revision and were applied throughout the extraction; Part 1 of this amendment supplies them and restores the ≤ operator in 3a. No definition in use changes. Timing disclosure: literature extraction was completed 15 November 2026 (all 326 included records processed; 31 cases graded) before the encasement suffix was adopted on 18 November 2026; the graded literature set was not retrospectively assessed for encasement. The principal investigator confirms he has no encasement cases in his own series. Eligibility, search, screening, the certainty-floor rule, and all planned analyses are unchanged.

Keywords trigeminal neuralgia; neurovascular compression; skull base tumor; basilar artery dolichoectasia; magnetic resonance imaging; systematic review.

Dissemination plans Manuscript submission to a peer-reviewed neurosurgical journal; results presented at relevant scientific meetings.

Contributions of each author

Author 1 - Michael Brisman.
Email: michaelbrisman@aol.com

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