



Review

Review of Patient Outcomes Following Nasal Fracture Reduction Under Local Anaesthesia Versus General Anaesthesia

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Abstract

The aim of this study article is to better understand patient outcomes following simple nasal fracture realignment, comparing outcomes when performed under LA versus GA. A systematic search of the evidence base is conducted. Data extraction and documentation are performed in keeping with PRISMA guidance. Critical appraisal tools are applied to aid quality assessment and assessment of bias. Twelve articles were selected for inclusion in this review, accumulating 2405 participants in total. No significant difference in patient outcomes between the LA and GA groups was observed. There was high variation in article quality, with some assessed as having a high risk of bias. Although some methodological limitations and outcome heterogeneity between studies hamper our ability for direct comparison, it seems likely that patient outcomes after nasal fracture correction under LA versus GA are comparable. Further large-scale studies with an agreed set of outcome measures are required to understand this relationship more fully.

Keywords: nasal fracture; anaesthesia; patient outcomes



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1. Introduction

Nasal bone fractures are the most common facial fractures, representing 40–50% of all facial bone injuries and ranking third among all skeletal fractures [1]. They occur twice as frequently in males as in females, with peak incidence in individuals aged 20–29 years [1]. These injuries can cause substantial functional impairment and cosmetic deformity [2]. Prompt, effective reduction of displaced nasal fractures in the acute setting reduces the need for secondary surgical intervention—reported in 14–50% of cases [3]—which is costly, resource-intensive, and associated with a considerable carbon footprint.

Higuera et al. classified nasal fractures into five grades (I–V) according to severity [4]. “Simple” fractures (types II and III) lack complicating features such as crush injury, open fracture, severe displacement, septal haematoma, airway obstruction, naso-orbito-ethmoid fractures, or cerebrospinal fluid rhinorrhoea. This study focuses exclusively on the management of such simple fractures.

Management may require manipulation under anaesthesia (MUA) within 2–3 weeks of injury. MUA involves realigning the nasal bones using external and/or internal manual or instrumental pressure, without surgical incisions. The procedure can be performed under local anaesthesia (LA) or general anaesthesia (GA). In the United Kingdom, there is no consensus on the preferred anaesthetic modality, as evidenced by variability in practice among ENT consultants [5].

LA MUA offers advantages in cost, resource utilisation, and accessibility. However, comparative outcome data for LA versus GA remain limited. The last comprehensive review and meta-analysis, conducted in 2015 by Al-Moraissi et al. [6], favoured GA on the basis of patient satisfaction and reduced need for secondary corrective surgery. Further studies have since been performed, and an updated review is therefore required.

This literature review compares patient outcomes following MUA for simple nasal fractures performed under LA versus GA, with the aim of providing evidence to guide clinical decision-making.

2. Materials and Methods

A background literature review is performed and drawn upon to guide the formulation of methodology, search strategy design, and the search terms utilised. The PICO model [7] is used to define the research question:

- Population: Patients over the age of 14, with a simple nasal fracture, who require MUA.
- Intervention and comparator: Closed MUA nasal fracture, under LA versus GA.
- Outcome measures are based on nasal fracture clinical indicators as laid out by AAO-HNS [8] and authors’ knowledge of best practice.

When articles were selected for inclusion, citation mining and scrutiny of each article’s ‘cited by’ list was performed to identify more potential articles of interest. A PRISMA flow of the search criteria and yield is provided in Figure A1.

Data extraction was performed according to the pre-defined outcome measures. The Joanna Briggs Institute (JBI) critical appraisal tool [9] was implemented as an assessment of bias, in order to aid meaningful critical analysis.

Ethical Considerations

This study takes the form of an extended literature review; as such, formal ethical approval from an ethics research committee is not required [10]. The ethical integrity of each individual study will be considered in data analysis, and patient anonymity will be maintained.

3. Results

The literature search took place on 29th June 2023. The combined search across multiple databases yielded 293 articles. This number was refined using the aforementioned selection criteria, resulting in 12 articles selected for inclusion in the review for full critical appraisal and analysis. The studies comprised five randomised trials and seven cohort studies (both retrospective and prospective). A total of 2405 patients were included in these studies collectively, with follow-up rates varying from 55.2% to 100%. The follow-up time period ranged from 2 weeks to 6 years.

A summary of the data extracted relating to each pre-defined outcome measure is provided in Table 1. A tabulated overview of the methodological design of each included article is available in Table A1.

Table 1. Outcomes matrix for all included articles.

Author	Time to Manipulation	Airway Satisfaction	Cosmetic Satisfaction	Pain	Requirement for Further Procedure	Would Patient Choose Procedure Again?
Pinto [11]	GA mean: 14.4 LA mean: 6.1	Not recorded	Not recorded	Not recorded	GA: 2.3% LA: 5.4%	Not recorded

Table 1. Cont.

Author	Time to Manipulation	Airway Satisfaction	Cosmetic Satisfaction	Pain	Requirement for Further Procedure	Would Patient Choose Procedure Again?
Bastianpallai [12]	GA mean: 14.6 LA mean: 12.2	GA: 2.88/5 pre-MUA, to 4.06/5 post-MUA LA: 2.86/5 pre-MUA, to 3.77/5 post-MUA	GA: 2/5 pre-MUA, to 3.94/5 post-MUA LA: 1.64/5 pre-MUA to 3.59/5 post-MUA	Not recorded	GA: 41.2% would consider LA: 59.1% would consider	GA: 94.1% yes LA: 95.5% yes
Courtney [13]	Not recorded	Not recorded	Not recorded	Not recorded	GA: 3.2% LA: 17.2%	Not recorded
Rajapakse [14]	GA mean: 6 LA mean: 10	GA: improvement in 3% LA: improvement in 2%	GA: improvement in 9% LA: improvement in 3%	Not recorded	GA: 3% LA: 10%	GA: 82% yes LA: 69% yes
Das [15]	Not recorded	No statistical difference in GA vs. LA outcomes	No statistical difference in GA vs. LA outcomes	Not recorded	5%	Not recorded
Zhu [16]	Not recorded	Overall satisfaction: GA: 2.8/3 Topical LA: 2.75/3 Infiltrative LA: 2.6/3	Not recorded	GA mean 4.5/10 at 6 h, 2.2/10 at 48 h Topical LA mean 5.9/10 at 6 h, 4.4/10 at 48 h Infiltrative LA mean 6.1/10 at 6 h, 5.1/10 at 48 h	Not recorded	Not recorded
Ridder [17]	Range: 100% within 12 days No significant difference GA vs. LA	Overall satisfaction: GA: 95% satisfaction LA: 94% satisfaction	Not recorded	Not recorded	No significant difference, figures not provided	Not recorded
Cook [18]	GA mean: 11.5 LA mean: 9.5	GA: improvement in 68% LA: improvement in 72%	GA: score 4/5 LA: score 4/5	LA: mean score 2.5/5	Not recorded	GA: 36% yes LA: 96% yes
Waldron [19]	GA mean: 10 LA mean: 8	Overall satisfaction: GA: improvement in 86% LA: improvement in 84%	Not recorded	Not recorded	GA: 14% LA: 16%	Not recorded
Atighechi [20]	GA mean: 6.5 Topical LA mean: 3 Infiltrative LA mean: 3.3	Overall satisfaction: GA: 92% Topical LA: 85% Infiltrative LA: 84%	Not recorded	On day 2: GA: 1.9/10 Topical LA: 2.35/10 Infiltrative LA: 2.47/10	GA: 5% Topical LA: 2% Infiltrative LA: 7%	Not recorded
Khwaja [21]	GA: 72% within 2 weeks LA: 95% within 2 weeks	Not recorded	GA: 72% within 2 weeks LA: 95% within 2 weeks	GA: mean score 2/10 LA: mean score 3/10	GA: 32.3% LA: 25.7%	GA: 32.3% LA: 25.7%
Watson [22]	GA median: 13 LA median: 10	GA: 75% satisfied LA: 82% satisfied	GA: improvement in 50% LA: improvement in 71%	Not recorded	GA: 42% LA: 6%	LA: 94% yes

The results for each outcome measure will be further summarised below.

3.1. Population

A total of 2405 participants were selected for inclusion in the selected studies. Of these, 1313 participants underwent MUA under GA, and 1092 underwent the procedure under LA. The mean age across the studies was 26 years (range 14–92 years). Males accounted for

65.4% of participants, while females made up 34.6%. All studies reported similar age and gender demographics between the LA and GA groups.

3.2. Anaesthetic Approach

The approach to achieving local anaesthesia in each of these studies was not homogeneous. A combination of topical and/or infiltrative local anaesthesia methods was adopted.

3.3. Procedural Approach

There was a wide variation in procedural approach, and documentation pertaining to this was observed across the studies. Two studies offered no clear description of the nasal fracture reduction method [11,12]. Two studies implemented different techniques in the LA versus the GA group [13,14]. Combinations of digital and instrumental fracture reduction were performed in the remaining studies, depending on the type of fracture. Five studies involved the application of an external nasal splint post-procedure in both the LA and GA groups [15–19]. The remaining patients used no post-procedure splint. Additional septal intervention was performed if required in three studies.

3.4. Time to Manipulation

This outcome measure is defined as the number of days from the nasal injury being sustained to when the participant underwent MUA (it is generally acknowledged that MUA shouldn't be performed more than 14 days post-injury). A trend towards shorter time to manipulation in the LA vs. GA group was observed; however, the mean and median times to manipulation provided in all the studies were within an acceptable time period.

3.5. Airway Satisfaction

Airway satisfaction was defined as the participant's perception of nasal airway function. No significant difference in LA versus GA airway outcomes was observed in these studies, though variation in methods of recording this outcome did hamper our ability to directly compare/combine different datasets.

3.6. Cosmetic Satisfaction

Cosmetic satisfaction is considered from the participant's point of view. Two studies did not collect data relating to participant cosmetic satisfaction post-MUA [11,13]. Of the remaining studies, none observed any significant difference between cosmetic satisfaction outcomes in the GA vs. LA groups.

3.7. Pain

Patient pain scores were recorded in 4/12 studies. There was variability in the timing of when participants were asked to rate their pain score, which makes comparison of the datasets difficult. Overall, no significant difference was observed in pain scores between the GA and LA groups. Pain scores in all studies were deemed acceptable.

3.8. Requirement for Further Procedure

This outcome measure is defined by any participant being offered or undergoing a subsequent corrective surgical procedure (rhinoplasty, septoplasty or septorhinoplasty) after the MUA. In total, 10/12 studies reported on this outcome measure. Eight papers did not reveal any significant difference in this outcome measure between the LA and GA groups (range 2–32%) [11–14,17,19–22]. One study noted statistical significance with 42% GA and 6% LA participants requiring further intervention [22]. In contrast, a different study observed statistical significance of increased requirement for further procedure in the LA group (GA 3.2%, LA 17.2%, Fisher's exact test p -value < 0.0001) [13].

3.9. Patient Anaesthetic Choice

This outcome measure is intended to be a reflection of participants' overall perception of the type of anaesthesia they underwent. Overall, participants tended to opt for the same anaesthesia method they had previously undergone, regardless of whether this was GA or LA. One study deviated from this trend, with 96% LA and just 36% GA opting for the same anaesthesia method again [18].

The Joanna Briggs Institute (JBI) Tool was implemented to provide an objective assessment of the relevance and reliability of each study design.

The included randomised trials performed to a similar level under this scrutiny. The most significant limitation to the robustness of these trials relates to allocation and exposure blinding. Blinding a participant to LA or GA exposure is not possible due to the inherent nature of the exposure affecting consciousness. It was, therefore, not possible for randomisation to be concealed, for participants to be blind to the assignment, for those delivering the intervention to be blind to the assignment, or for those assessing the outcome to be blind.

Of the cohort studies, exposures were measured similarly within each group, in a valid and reliable way. Collectively, the most significant shortcomings came from the lack of identification and mitigation of confounding factors.

4. Discussion

Simple nasal fractures are commonly managed with MUA, performed under either LA or GA. Currently, there is no consensus regarding the preferred anaesthetic approach. This review synthesised available evidence to compare patient outcomes between LA and GA MUA. Twelve studies met the inclusion criteria—five randomised controlled trials and seven cohort studies—comprising 2405 participants with a mean age of 26 years. Across studies, population demographics and mechanisms of injury were broadly comparable.

Before discussing specific outcomes, it is important to acknowledge the absence of a standardised method for assessing patient satisfaction following MUA. Satisfaction is influenced by multiple confounding factors, including cultural and social context, and remains inherently subjective. Consequently, results are interpreted with caution and without overstatement.

The requirement for secondary procedures may serve as a surrogate marker of procedural success and patient satisfaction, and it carries substantial financial and environmental implications. None of the included studies demonstrated a statistically significant difference in re-intervention rates between LA and GA. However, reported rates varied widely (2–59.1%), likely reflecting heterogeneity in follow-up duration (ranging from 2 weeks to 6 years). Follow-up at 2 weeks may not allow for resolution of post-procedural swelling and establishment of a new symptomatic baseline, whereas prolonged follow-up introduces recall bias. Additional factors such as healthcare access, availability of rhinoplasty services, and treatment sought elsewhere may further distort results. Splint application appeared unrelated to re-intervention rates, whereas concomitant septal trauma was associated with increased need for secondary procedures, predominantly septoplasty. This observation suggests that isolated bony fractures may be effectively managed with LA MUA, whereas fractures accompanied by septal injury might benefit from primary MUA combined with septoplasty under GA. Notably, the fracture classification system applied in this review does not account for septal injury, which may represent a valuable future refinement.

With respect to time to manipulation, there was a tendency for GA cases to experience longer delays; however, mean times for both groups remained within acceptable clinical limits, and no meaningful conclusions could be drawn. Increasing pressure on healthcare

resources and limited operating theatre availability may make timely GA MUA increasingly challenging in the future.

Airway and cosmetic satisfaction rates were generally high and did not differ significantly between groups, though direct comparisons were hindered by inconsistent measurement methods. This also hindered further subgroup analysis of the variety of LA techniques utilised, which would be of great value. Pain outcomes, reported in four studies, tended to favour GA, but heterogeneity in assessment timing precluded definitive conclusions. Importantly, pain levels in both groups were acceptable, often likened to discomfort experienced during minor dental procedures. When asked which anaesthesia they would choose if requiring repeat MUA, most participants preferred the modality they had previously received, suggesting overall acceptability of both approaches. Only one study captured surgeon-reported procedural experience, which was comparable between LA and GA.

MUA was consistently reported as safe under both anaesthetic techniques, with adverse events occurring at rates and severities consistent with known procedural risks.

Several limitations affect the interpretation of these findings. Methodological quality varied across studies, and double-blinding is inherently unfeasible in this context. A true control group (no MUA) could provide valuable comparison data, but would be ethically problematic. Procedural variability—such as differences in digital versus instrumental manipulation, inclusion of septal interventions, and splint application—introduces additional heterogeneity, as do inconsistencies in outcome measurement and incomplete datasets. This variability precluded meta-analysis and limits the strength of direct comparisons.

Although these results do not establish a clear superiority of LA or GA, they contrast with the most recent prior systematic review, published in 2015, which favoured GA based on anaesthetic satisfaction, nasal form and function, and re-intervention rates [6]. Our findings instead suggest broadly equivalent outcomes between modalities while highlighting the need for higher-quality, standardised research to address current knowledge gaps in this field.

5. Conclusions

This review has provided a comprehensive overview of the current literature base pertaining to the topic of nasal fracture MUA under LA versus GA. The data allows us to come closer to understanding this relationship and expose areas where further investigation is required. It seems likely that the patient outcomes observed are comparable between the LA and the GA groups, though further research is required to understand this more deeply. If GA and LA results are comparable, it is acknowledged that LA is less resource-intensive and may, therefore, be preferable.

Through this process, other pertinent questions have been raised as potential areas for future research, for example, which LA technique is most effective. Further to this, the inclusion of a control group could take us further in understanding the benefits/limitations of performing MUA. A suggested method to include a control group in future studies would be to collect data regarding patients who decline procedural intervention after sustaining a nasal fracture. An agreed set of outcome measures ahead of future studies may help in providing data heterogeneity and facilitate comparison between studies.

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Abbreviations

The following abbreviations are used in this manuscript:

MUA Manipulation under anaesthesia

LA Local anaesthetic

GA General anaesthetic

Appendix A

Table A1. Methodological matrix for included articles.

Author	Study Design	No. of Participants	LA Technique	Surgical Technique	Follow Up: Duration Rate
Pinto [11]	Retrospective and prospective cohort study	GA: $n = 525$ LA: $n = 119$	Not defined	Not defined	Not provided
Bastianpallai [12]	Retrospective study	GA: $n = 21$ LA: $n = 27$	Topical: 2.5 mL lidocaine hydrochloride and phenylephrine hydrochloride spray + Infiltrative: external nasal nerve block (1 mL 2% lidocaine)	Not defined No septal intervention done	1 month. GA: 81% LA: 81%
Courtney [13]	Retrospective cohort study	GA: $n = 338$ LA: $n = 217$	Topical: intranasal spray (5% lidocaine hydrochloride/0.5% phenylephrine hydrochloride/0.1 mg/mL benzalkonium chloride) and paste (10% cocaine/0.06% adrenaline) + Infiltrative: 2% lidocaine/1:80,000 adrenaline inter-alar injection	No septal intervention GA group: digital and instrumental manipulation, external nasal splint +/– nasal packing LA group: digital and instrumental manipulation, no splint and no packing	6 months–6 yrs. GA: 55.2% LA: 61.8%
Rajapakse [14]	Retrospective cohort study	GA: $n = 17$ LA: $n = 90$	Topical: intranasal spray (5% lidocaine hydrochloride/0.5% phenylephrine hydrochloride/0.1 mg/mL benzalkonium chloride) and paste (10% cocaine/0.06% adrenaline) + Infiltrative: 2% lidocaine/1:80,000 adrenaline intranasal injection	No septal intervention GA group: digital and instrumental manipulation, external nasal splint +/– nasal packing LA group: digital and instrumental manipulation, no splint and no packing	6 months–6 yrs. GA: 67% LA: 66%
Das [15]	Cohort study	GA: $n = 13$ LA: $n = 7$	Infiltrative: 2% lidocaine hydrochloride/1:100,000 epinephrine	Digital and instrumental manipulation Septal manipulation External splint applied	14 days. 100%
Zhu [16]	RCT	GA: $n = 127$ Topical LA: $n = 127$ Infiltrative LA: $n = 127$	Topical LA: intra-nasal lidocaine-impregnated mesh Infiltrative LA: external nasal nerves and infra-trochlear nerve block (1% lidocaine hydrochloride + epinephrine)	Digital and instrumental manipulation Intra-nasal tampons used for depressed segments External nasal splint No septal intervention	6 h, 48 h, day 25. 100%
Ridder [17]	Retrospective cohort study	GA: $n = 21$ LA: $n = 68$	Topical: intranasal tampon soaked in tetracycline and xylometazoline 0.1% +/– Infiltrative: infratrochlear, infraorbital and nasopalatine nerve block using 1–2% lidocaine/1:100,000 epinephrine	Digital and instrumental manipulation. External nasal splint. +/– septoplasty in GA group	12–24 mnths. Rate not mentioned
Cook [18]	Randomised prospective study	GA: $n = 25$ LA: $n = 25$	Topical: 10% cocaine solution intranasal + Infiltrative: infraorbital, infratrochlear and external nasal nerve block using 2 mL 0.5% bupivacaine/1:200,000 adrenaline	Instrumental manipulation +/– external nasal splint No septal intervention	4 h and 8 weeks. 100%

Table A1. Cont.

Author	Study Design	No. of Participants	LA Technique	Surgical Technique	Follow Up: Duration Rate
Waldron [19]	Prospective trial	GA: <i>n</i> = 50 LA: <i>n</i> = 54	Topical: 10% cocaine spray intranasal. Then x3 intranasal cotton wool wires with 25% cocaine paste + Infiltrative: Infratrochlear and external nasal nerve blocks using 1 mL 2% lidocaine/1:80,000 adrenaline	Digital and instrumental manipulation. +/- nasal packing +/- external nasal splint. No septal intervention.	Day 0, days 10, and 3 months. GA: 100% LA: 93%
Atighechi [20]	Prospective study	GA: <i>n</i> = 72 Topical LA: <i>n</i> = 52 Infiltrative LA: <i>n</i> = 68	Topical LA: intranasal mesh (impregnated with 10% lidocaine spray + 0.5% phenylephrine) Infiltrative LA: external nasal nerves and infra-trochlear nerve block (1–2 mL 2% lidocaine with 1:100,000 epinephrine)	Digital pressure +/- instrumental pressure Nasal tampon for depressed segments No septal intervention	30 days. Rate not mentioned
Khwaja [21]	Randomised prospective study	GA: <i>n</i> = 84 LA: <i>n</i> = 91	Infiltrative: external nasal nerve block (1 mL 2% lidocaine/1:80,000)	Digital pressure Instrumental manipulation for depressed segments No septal intervention No nasal splint	Day 0 and day 14. GA: 76% LA: 81%
Watson [22]	Randomised prospective study	GA: <i>n</i> = 20 LA: <i>n</i> = 20	Topical: 10% intranasal cocaine spray. + Infiltrative: 2 mL 2% lidocaine/1:80,000 adrenaline at nasal root	Digital manipulation +/- septal manipulation	4 weeks. GA: 60% LA: 85%

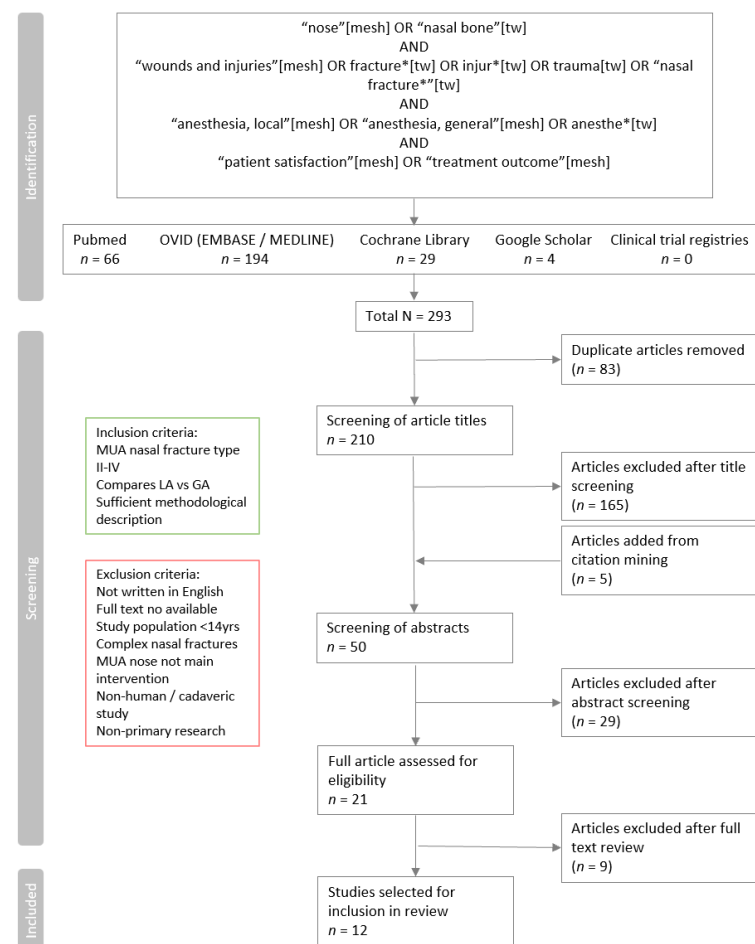


Figure A1. A PRISMA flow diagram: a schematised representation of search criteria, yield, and screening process. Note: * = wildcard, a function used to search for multiple alternative word endings at a time.

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