



ANAESTHETIC MANAGEMENT OF TRAUMATIC FINGER AMPUTATION: A CASE REPORT

¹ I Kadek Bayu Suartawan, ² Ni Wayan Tina Ayu Putri Utami

^{1,2} Faculty of Medicine, Wijaya Kusuma University, Surabaya, Indonesia

Email : bayusuartawan30@gmail.com

Article History :

Received date : 2026/06/11

Revised date : 2026/07/15

Accepted date : 2026/08/07

Published date : 2026/09/28



Copyright: © 2024 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (BY NC) license (<https://creativecommons.org/licenses/by-nc/4.0/>).

E-ISSN :

ISSN 3048-1368



P-ISSN

ISSN 3048-1376



ABSTRACT

Introduction: Traumatic digital amputation is one of the most frequent injuries of the upper extremity and usually requires urgent debridement, stump revision and skeletal stabilisation. The anaesthetic plan in this emergency setting must reconcile surgical urgency, the presumed full stomach of the trauma patient, patient cooperation and the need for effective perioperative analgesia. Although brachial plexus block is frequently advocated for hand surgery, general anaesthesia remains a valid option in selected situations.

Case presentation: A 40-year-old man sustained a motorcycle collision in which his right hand was dragged along the asphalt. He presented fully conscious (Glasgow Coma Scale E4V5M6) and haemodynamically stable (blood pressure 110/60 mmHg, heart rate 62 beats/min, SpO₂ 99%) with traumatic amputation (vulnus amputatum) of the right little finger and open fractures of the middle phalanges of the right middle and ring fingers. Laboratory testing showed leucocytosis ($13.52 \times 10^3/\mu\text{L}$) with neutrophilia and a neutrophil-to-lymphocyte ratio of 5.08; haemostasis, renal and hepatic function were normal, and the electrocardiogram

showed sinus rhythm. He was classified as ASA physical status I-E.

Management and outcome: Emergency (cito) wound debridement, stump plasty of the fifth digit and open reduction with Kirschner-wire fixation of the third and fourth digits were performed in the supine position under general anaesthesia, chosen because of the urgency of the procedure, the limited cooperation of the patient and the need for optimal immobility and airway control. Anaesthesia lasted 60 minutes and surgery 45 minutes, with minimal blood loss and no anaesthetic or surgical complication. Postoperative care comprised intravenous ceftriaxone, balanced crystalloid infusion, tetanus immunoprophylaxis and multimodal analgesia; on follow-up the wound was clean and dry with good distal neurovascular status.

Conclusion: General anaesthesia is a safe and appropriate technique for emergency finger amputation when regional anaesthesia is impractical, provided that aspiration precautions, adequate anaesthetic depth and an opioid-sparing multimodal analgesic strategy are applied. Regional techniques should be considered as analgesic adjuncts whenever feasible.

Keywords: finger amputation; hand trauma; general anaesthesia; brachial plexus block; full stomach; multimodal analgesia; case report

INTRODUCTION

Traumatic amputation of the digits represents a substantial proportion of upper-limb trauma and carries lasting functional, occupational and psychosocial consequences. Large single-centre series show a marked predominance of working-age men, with occupational injuries, sharp and blunt mechanisms, avulsion and road-traffic accidents as the principal aetiologies, and with multiple-digit involvement in a meaningful minority of cases. Such injuries are infrequent in daily practice compared with lower-limb amputations but must be addressed urgently because the timing and quality of the index operation determine wound healing and eventual hand function.¹⁻³

Definitive surgical management consists of either microsurgical replantation or revision (completion) amputation with stump plasty. Replantation is generally recommended for the thumb, for multiple-digit injuries and for selected single-finger amputations, whereas for the small finger the functional results of replantation and revision amputation appear comparable. Revision amputation yields good sensibility and near-normal total active motion of the remaining digits, although cold intolerance is common. When the amputated segment is crushed, avulsed or grossly contaminated, as frequently occurs after road-traffic injuries, revision amputation with debridement and fixation of associated fractures is the pragmatic choice.⁴⁻⁶

The anaesthetic options for hand surgery include general anaesthesia (GA), brachial plexus block, intravenous regional anaesthesia and wide-awake local anaesthesia no tourniquet (WALANT). Regional anaesthesia provides superior early analgesia, less postoperative nausea and vomiting and faster discharge than GA, although these benefits do not necessarily persist beyond the first postoperative days. Registry data suggest that avoiding GA may reduce overall complications after hand surgery, yet short-term complication and reoperation rates after open treatment of hand fractures are broadly similar irrespective of anaesthetic type. Newer approaches, including ultrasound-guided distal blocks and WALANT, have further widened the range of techniques available to the anaesthesiologist.⁷⁻¹⁰

Emergency hand trauma adds specific challenges to this choice: patients are frequently non-fasted, anxious and in pain, and stress, pain and opioids delay gastric emptying so that the stomach may be full at the time of induction. Emergency procedures carry a considerably higher risk of regurgitation and pulmonary aspiration than elective surgery. This report describes the anaesthetic management of a 40-year-old man who underwent emergency debridement, stump plasty and Kirschner-wire fixation for traumatic finger amputation under GA, and discusses the rationale for technique selection, airway strategy, perioperative analgesia and prevention of chronic post-amputation pain in the light of current evidence.^{11,12}

CASE PRESENTATION

Patient information

A 40-year-old Indonesian man presented to the emergency department of a regional general hospital in Tabanan, Bali, Indonesia, in the early morning of 26 July 2026, complaining of painful open wounds of the right little finger. He had been riding a motorcycle when another motorcyclist travelling in the opposite direction side-swiped him; he lost his balance, fell to the right and his right hand was dragged along the asphalt road surface. He remained conscious and recalled the entire event, and he denied loss of consciousness, nausea and vomiting. There was no relevant past medical history, no regular medication and no known drug allergy. [Please complete from the medical record: time of injury, time of last solid food and clear fluid intake, hand dominance, occupation, smoking/alcohol status, previous anaesthetic exposure, body weight and height].

Clinical findings

On arrival the patient was alert with a Glasgow Coma Scale of E4V5M6 and stable vital signs (Table 1). The conjunctivae were not pale, the sclerae were anicteric, and the pupils were isocoric with brisk light reflexes bilaterally. Cardiac auscultation revealed regular first and second heart sounds without murmur, and the lungs were clear with vesicular breath sounds and neither rhonchi nor wheezes. The abdomen was soft with normal bowel sounds and no tenderness, and the extremities were warm without oedema. No other injury was identified on secondary survey.

Table 1. Vital signs and general examination on admission.

Parameter	Finding	Interpretation
Level of consciousness	Alert; GCS E4V5M6 (15)	No clinical head injury
Blood pressure	110/60 mmHg	Normotensive
Heart rate	62 beats/min, regular	Normal; no tachycardia
Respiratory rate	22 breaths/min	Mildly elevated (pain/anxiety)
Axillary temperature	36.5 °C	Afebrile
Peripheral oxygen saturation	99% on room air	Normal
Head, eyes	No anaemia, no icterus, pupils isocoric, light reflex +/+	Normal
Heart	S1–S2 single, regular, no murmur	Normal
Lungs	Vesicular +/+, rhonchi –/–, wheeze –/–	Normal
Abdomen	Soft, bowel sounds present, non-tender	Normal
Extremities	Warm +/+, oedema –/–	Adequate peripheral perfusion

GCS, Glasgow Coma Scale; S1–S2, first and second heart sounds.

Examination of the right hand (Figure 1) showed an open wound of the fourth digit with minimal active bleeding, visible deformity and crepitus; active range of motion was preserved and pulse oximetry of the digit read 99%. The fifth digit showed an open, mutilating wound with minimal active bleeding, gross deformity and limited range of motion, and its pulse-oximetric signal could not be obtained, indicating compromised perfusion of the distal segment. The palm and adjacent digits showed abrasions contaminated with road debris, consistent with the dragging mechanism.



Figure 1. Clinical photographs of the right hand on admission. (A) Palmar view showing the mutilated fifth digit with soft-tissue disruption and haemorrhage, a wound over the fourth digit, and abrasions of the palm contaminated with road debris. (B) Dorsal view demonstrating the extent of soft-tissue injury of the fifth digit and the laceration over the fourth digit. No identifying features are shown.

Diagnostic assessment

Laboratory investigations obtained in the emergency department are summarised in Table 2. The complete blood count showed leucocytosis ($13.52 \times 10^3/\mu\text{L}$) with absolute neutrophilia ($10.72 \times 10^3/\mu\text{L}$), relative lymphopenia (15.6%) and a neutrophil-to-lymphocyte ratio (NLR) of 5.08. Haemoglobin, haematocrit and platelet count were normal, as were bleeding and clotting times, random blood glucose, liver transaminases, serum creatinine and blood urea nitrogen. In an otherwise healthy adult without clinical signs of infection, this pattern is most consistent with the acute neuroendocrine stress response to trauma rather than established infection; adult reference data place the upper limit of NLR at approximately 3.8, and values above this threshold have been associated with a higher risk of subsequent post-traumatic infection.^{13,14}

Table 2. Pre-operative laboratory results (26 July 2026; specimen received 06:50, reported 08:00).

Parameter	Result	Unit	Reference range
-----------	--------	------	-----------------

Haemoglobin	14.8	g/dL	13.2–17.3
Erythrocytes	4.56	$\times 10^6/\mu\text{L}$	4.4–5.9
Leucocytes	13.52 (H)	$\times 10^3/\mu\text{L}$	3.8–10.6
Platelets	282	$\times 10^3/\mu\text{L}$	150–440
Haematocrit	43.1	%	40–52
MCV / MCH / MCHC	94.5 / 32.5 / 34.3	fL / pg / g/dL	80–100 / 26–34 / 32–36
RDW / MPV	11.8 / 8.6	% / fL	11.5–14.5 / 7.0–11.0
Neutrophils (absolute)	10.72 (H)	$\times 10^3/\mu\text{L}$	1.8–8.0
Lymphocytes (absolute)	2.11	$\times 10^3/\mu\text{L}$	0.9–5.2
Monocytes / eosinophils / basophils (absolute)	0.55 / 0.08 / 0.06	$\times 10^3/\mu\text{L}$	0.16–1 / 0.045–0.44 / 0–0.2
Neutrophils / lymphocytes (%)	79.3 (H) / 15.6 (L)	%	50–70 / 25–40
Monocytes / eosinophils / basophils (%)	4.1 / 0.6 (L) / 0.4	%	2–8 / 2–4 / 0–1
Neutrophil-to-lymphocyte ratio	5.08 (H)	—	< 3.13
Bleeding time (Ivy)	1 min 30 s	min	1–3
Clotting time	8 min 30 s	min	8–15
Random blood glucose	98	mg/dL	74–106
AST / ALT	30 / 19	U/L	0–50 / 0–50
Creatinine	0.71	mg/dL	0.70–1.10
Blood urea nitrogen	12	mg/dL	6–20

H, above reference range; L, below reference range; MCV, mean corpuscular volume; MCH, mean corpuscular haemoglobin; MCHC, mean corpuscular haemoglobin concentration; RDW, red cell distribution width; MPV, mean platelet volume; AST, aspartate aminotransferase; ALT, alanine aminotransferase. Reference ranges as reported by the hospital laboratory.

A resting 12-lead electrocardiogram recorded at 06:27 showed sinus rhythm at 76 beats/min without acute ST-segment or T-wave changes or conduction abnormality (Figure 3). Plain radiographs of the right hand in posteroanterior and oblique projections obtained at 05:28 (Figure 2) demonstrated comminuted fractures with bone and soft-tissue loss of the fifth digit and fractures of the phalanges of the third and fourth digits with an overlying soft-tissue defect, with no carpal or metacarpal injury.

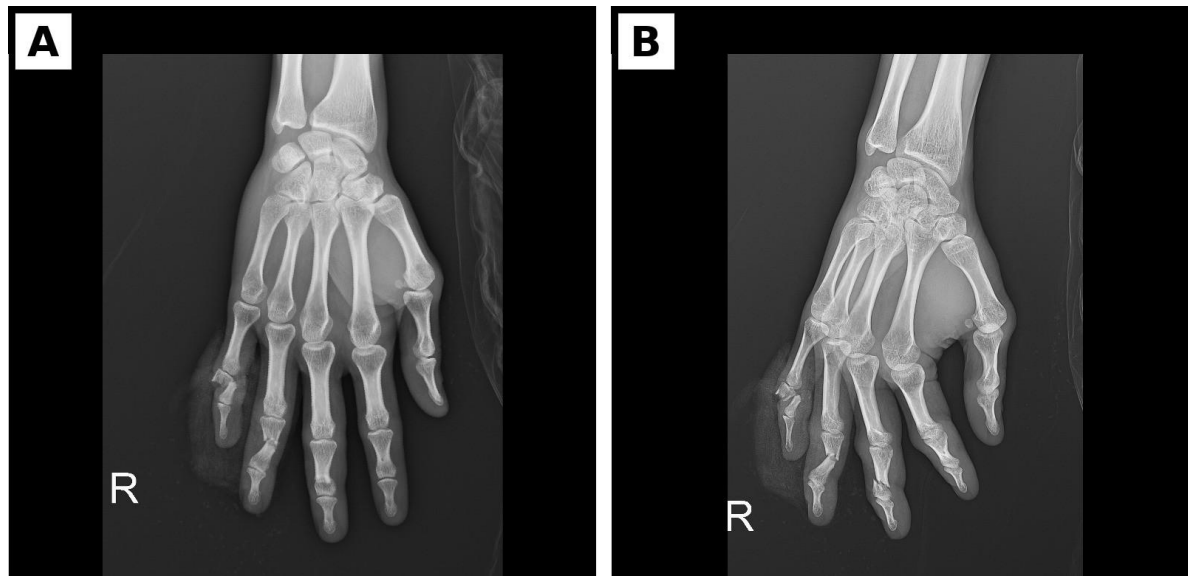


Figure 2. Pre-operative radiographs of the right hand, (A) posteroanterior and (B) oblique projections, showing comminuted fracture with bone loss of the fifth digit and phalangeal fractures of the third and fourth digits with surrounding soft-tissue swelling and defect; the carpus and metacarpals are intact. Patient identifiers have been removed.

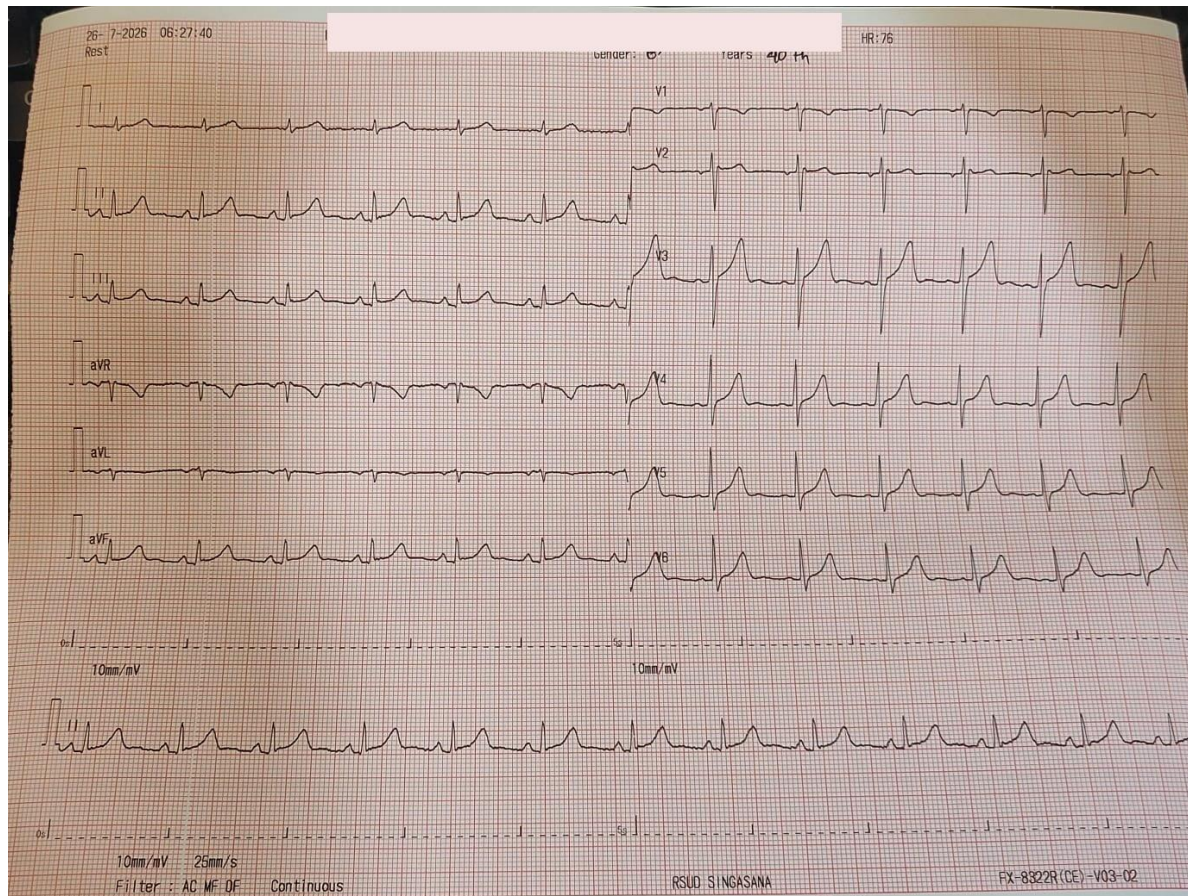


Figure 3. Pre-operative resting 12-lead electrocardiogram (06:27) showing sinus rhythm at 76 beats/min, with no acute ischaemic ST–T changes or conduction abnormality. Patient identifiers have been masked.

The emergency department working diagnosis recorded an open fracture of the fifth digit and fractures of the third and fourth digits of the right hand. The pre- and postoperative diagnoses documented in the operative report were traumatic amputation (vulnus amputatum) of the fifth digit with open fractures of the middle phalanges of the third and fourth digits of the right hand. The patient was assigned American Society of Anesthesiologists (ASA) physical status I-E and, by virtue of the recent trauma, was managed as having a presumed full stomach. [Airway assessment to be completed from the pre-anaesthetic record: Mallampati class, mouth opening, thyromental distance, neck mobility, dentition].

Therapeutic intervention

Pre-operative management

Pre-operative orders comprised intravenous ceftriaxone 2 g as antibiotic prophylaxis for an open, contaminated injury, a balanced crystalloid solution (Futrolit®) at 18 drops/min, an analgesic (Peinlos®, as recorded) twice daily, and one ampoule of human tetanus immunoglobulin (Tetagam®). The planned procedure was urgent (cito) wound debridement, stump plasty of the fifth digit and open reduction with internal fixation (ORIF) of the third and fourth digits. The nature of the injury, the proposed procedure and the anaesthetic options with their risks were explained, and written informed consent for surgery and anaesthesia was obtained.

Choice of anaesthetic technique

General anaesthesia was selected. The procedure was an emergency operation on a contaminated, mutilating injury involving three digits, with bone work (K-wire insertion) that is intensely stimulating and requires an immobile operative field. The patient was in pain, anxious and judged to be insufficiently cooperative for an awake technique, which would have made both the performance of a brachial plexus block and prolonged awake surgery difficult, and would have increased the probability of conversion to GA under less controlled conditions. GA also offered definitive airway control and allowed the procedure to begin without the latency of block onset. The analgesic advantages of a brachial plexus block were acknowledged, and an opioid-sparing multimodal analgesic plan was therefore incorporated for the postoperative period. The comparative considerations are summarised in Table 3.^{7,9,10}

Table 3. Anaesthetic options considered for emergency finger amputation in the present patient.

Technique	Principal advantages	Limitations in this patient	Decision
General anaesthesia (GA)	Reliable, rapid onset; complete immobility; airway control; independent of patient cooperation	Full-stomach aspiration risk; more PONV; higher early opioid requirement; no residual analgesia	Selected

US-guided brachial plexus block (supraclavicular, infraclavicular or axillary) ± sedation	Excellent intra- and early postoperative analgesia; fewer PONV; faster recovery and discharge	Requires cooperative patient; latency; risk of incomplete block needing GA conversion; supraclavicular approach may cause phrenic paresis; rebound pain on resolution	Not used as primary technique; valuable adjunct
WALANT / digital block	Avoids GA and tourniquet; permits intraoperative functional testing; low cost	Limited to distal, cooperative cases; contaminated multi-digit crush wound; patient anxiety	Not appropriate
Intravenous regional anaesthesia (Bier block)	Simple; rapid onset; good for short procedures	Tourniquet discomfort; local-anaesthetic systemic toxicity risk if cuff fails; no postoperative analgesia	Not appropriate

GA, general anaesthesia; PONV, postoperative nausea and vomiting; US, ultrasound; WALANT, wide-awake local anaesthesia no tourniquet.

Intra-operative anaesthetic management

General anaesthesia was induced at 08:55 with the patient supine and the right upper limb abducted on an arm table. Surgery began at 09:00 and ended at 09:45 (45 minutes), and anaesthesia ended at 09:55, giving a total anaesthetic time of 60 minutes. Blood loss was minimal, no anaesthetic or surgical complication occurred, and the patient emerged uneventfully. The details of the intraoperative anaesthetic record are presented in Table 4; items highlighted in the table must be completed from the original anaesthesia chart before submission, so that the report reflects exactly what was administered.

Table 4. Intraoperative anaesthetic record.

Item	Details
------	---------

Urgency / complexity	Cito (emergency); major surgery
ASA physical status	I-E; presumed full stomach
Anaesthetic technique	General anaesthesia
Position	Supine, right upper limb on arm table
Monitoring	[e.g., ECG, non-invasive BP, SpO ₂ , EtCO ₂ , temperature — confirm]
Pre-medication / aspiration prophylaxis	[drug, dose, time — e.g., antacid/H ₂ -blocker/antiemetic, if given]
Pre-oxygenation	[method, duration]
Induction agents	[hypnotic and opioid with doses (mg or µg/kg)]
Neuromuscular blocking agent	[drug and dose; RSI yes/no; cricoid pressure yes/no]
Airway device	[cuffed endotracheal tube (size) or second-generation supraglottic airway (type, size)]
Maintenance	[volatile agent/TIVA, O ₂ /air or N ₂ O fraction, ventilation mode]
Intraoperative analgesia	[opioid top-up, paracetamol, NSAID, ketamine, wound/digital-nerve infiltration by surgeon]
PONV prophylaxis	[e.g., dexamethasone, ondansetron — dose]
Antibiotic prophylaxis	Ceftriaxone 2 g IV pre-operatively [time relative to incision]
Tourniquet	[pneumatic arm tourniquet used? pressure and inflation time]
Fluids	Balanced crystalloid (Futrolit®) [total volume]
Haemodynamic course	[range of BP/HR/SpO ₂ during surgery]
Blood loss / transfusion	Minimal / none
Duration	Anaesthesia 08:55–09:55 (60 min); surgery 09:00–09:45 (45 min)
Emergence and extubation	Uneventful [reversal agent, if used; Aldrete score on PACU admission and discharge]
Complications	None

Highlighted fields are intentionally left for completion from the primary anaesthesia chart, which was not included in the source documents. ASA, American Society of Anesthesiologists; BP, blood pressure; EtCO₂, end-tidal carbon dioxide; NSAID, non-steroidal anti-inflammatory drug; PACU, post-anaesthesia care unit; PONV, postoperative nausea and vomiting; RSI, rapid sequence induction; TIVA, total intravenous anaesthesia.

Surgical procedure

After disinfection and draping, the wounds were debrided and devitalised tissue and debris were excised. Stump plasty of the fifth digit was performed, and ORIF of the third and fourth digits was achieved by pinning with 1.2-mm Kirschner wires. Stability was confirmed intraoperatively, the wounds were irrigated, haemostasis was secured and the wounds were closed and dressed. No specimen was sent for histopathology. [Note: the implant field of the operative report lists a 1.0-mm K-wire whereas the operative description states 1.2 mm; please verify the wire diameter.]

Follow-up and outcomes

Post-operative radiographs obtained at 10:51 (Figure 4) confirmed completion amputation of the fifth digit and longitudinal Kirschner-wire fixation of the third and fourth digits in acceptable alignment. Post-operative instructions comprised intravenous ceftriaxone 1 g twice daily, balanced crystalloid infusion at 18 drops/min, analgesia according to the anaesthesiology service, control radiography and observation of symptoms, vital signs and signs of bleeding.

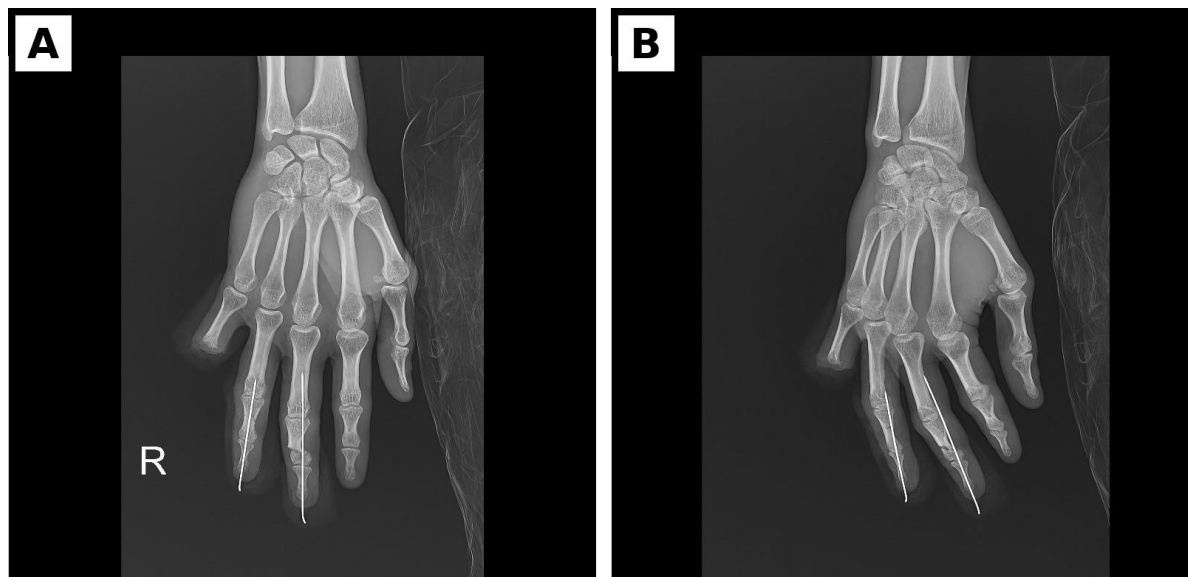


Figure 4. Post-operative radiographs of the right hand, (A) posteroanterior and (B) oblique projections (10:51), showing the stump of the fifth digit after completion amputation and longitudinal Kirschner-wire fixation of the third and fourth digits in acceptable alignment. Patient identifiers have been removed.

At the post-operative review the patient reported wound pain. The dressing was clean and dry, with oedema of the right hand, local tenderness and no sign of infection; the distal arteries, veins and nerves of the operated digits were intact, and range of motion was fair. The assessment was the post-operative state after debridement, stump plasty and ORIF with pinning for traumatic amputation of the fifth digit and open fractures of the middle phalanges of the third and fourth digits of the right hand. The plan was to continue antibiotic therapy, analgesia and wound care with scheduled radiographic control.

Table 5. Timeline of clinical events (CARE format).

Time (26 July 2026)	Event
Early morning	Road-traffic accident (motorcycle side-swipe); right hand dragged along asphalt; arrival at emergency department

05:28	Radiographs of the right hand (posteroanterior and oblique)
06:27	Resting 12-lead ECG: sinus rhythm, 76 beats/min
06:50	Blood specimen received by laboratory
08:00	Laboratory results reported: leucocytosis $13.52 \times 10^3/\mu\text{L}$, NLR 5.08, otherwise normal
Pre-operative	Ceftriaxone 2 g IV, balanced crystalloid, analgesic, tetanus immunoglobulin; informed consent
08:55	Induction of general anaesthesia, supine position
09:00–09:45	Debridement, stump plasty of digit V, ORIF with K-wire pinning of digits III and IV
09:55	End of anaesthesia; uneventful emergence
10:51	Post-operative radiographs: stump of digit V and K-wires in digits III–IV
Post-operative review	Clean dry dressing, oedema, no infection, good distal neurovascular status

ECG, electrocardiogram; NLR, neutrophil-to-lymphocyte ratio; ORIF, open reduction and internal fixation.

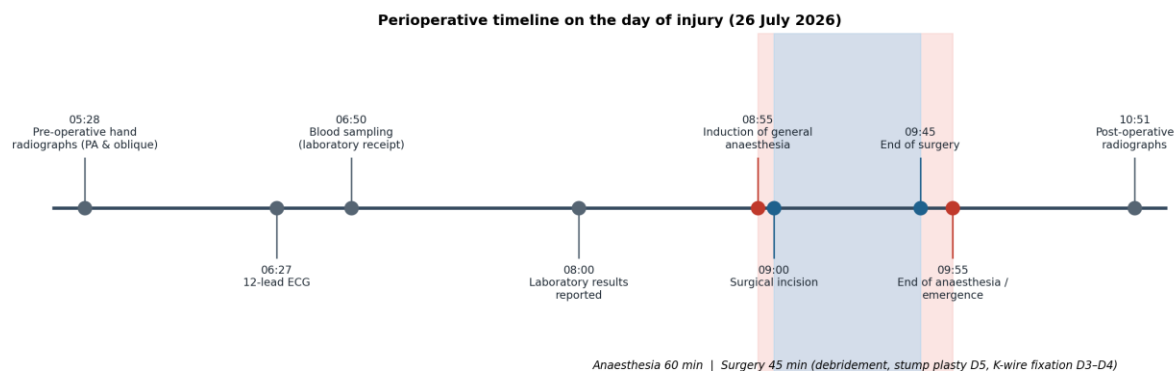


Figure 5. Perioperative timeline on the day of injury. The pink band marks the anaesthetic period (08:55–09:55) and the blue band the surgical period (09:00–09:45).

DISCUSSION

This case illustrates the anaesthetic management of a common but functionally important injury: a traumatic amputation of the small finger combined with open phalangeal fractures of two adjacent digits after a road-traffic accident. Because the small finger contributes least to overall hand function and the outcomes of replantation and revision amputation at this digit are comparable, revision amputation with stump plasty and stabilisation of the neighbouring fractures was the appropriate surgical strategy, particularly given the crushing and contaminated mechanism. The anaesthetic task was therefore to deliver safe, rapid and reliable surgical conditions for a short but stimulating emergency procedure in a non-fasted trauma patient.^{4,5}

Pre-anaesthetic evaluation and aspiration risk

Pulmonary aspiration remains among the most feared complications of emergency anaesthesia. In a review of more than 166,000 anaesthetics, emergency procedures were associated with an odds ratio of about 27 for aspiration compared with elective surgery, and most regurgitation events that occurred during induction progressed to aspiration. In trauma patients, pain, sympathetic activation and opioid administration delay gastric emptying, and the time elapsed since the last meal is a poor predictor of gastric content: prospective gastric-ultrasound studies found a full stomach in 18–56% of emergency surgical patients at induction, without correlation with fasting time.^{11,12}

Point-of-care gastric ultrasound offers an objective means of stratifying this risk. In a cohort of more than 2,000 patients, routine pre-operative gastric sonography changed anaesthetic management in approximately one in five, allowing a more liberal approach in some and prompting a more conservative approach in others. Where gastric ultrasound is unavailable, as in many regional hospitals, the prudent default in a recently injured patient is to assume a full stomach and to plan induction and airway management accordingly. Documenting the interval between the last meal and the injury, rather than the interval to surgery, is therefore an essential element of the pre-anaesthetic record.^{11,15}

The mild leucocytosis with neutrophilia and relative lymphopenia in this patient deserves brief comment. The NLR integrates innate and adaptive immune responses and rises rapidly after trauma, surgery and systemic stress, often preceding clinical changes. An NLR of 5.08 in a

1346

previously healthy man seen within hours of injury, without fever or clinical evidence of infection, most plausibly reflects the physiological stress response. Nevertheless, NLR values above approximately 4 have been independently associated with post-traumatic infection, which, together with the contaminated nature of the wound, supports prompt debridement, appropriate antibiotic prophylaxis and vigilant post-operative wound surveillance. Elevated pre-operative NLR has also been reported as an independent risk factor for rebound pain after peripheral nerve block in orthopaedic trauma surgery, a finding relevant to analgesic planning.^{13,14,16}

Rationale for general anaesthesia

The decision to use GA in this patient rested on three considerations. First, the operation was an emergency on a contaminated, three-digit injury requiring debridement, amputation revision and bone fixation, in which immobility of the operative field and uninterrupted surgical conditions are important. Secondly, the patient was anxious, in pain and judged insufficiently cooperative for an awake technique. Patient preference and cooperation strongly influence the success of regional anaesthesia: surveys consistently show that many patients prefer GA because they fear being awake, seeing or hearing the operation, or feeling pain, and that most patients awaiting upper-limb trauma surgery expect to be asleep. Thirdly, dissatisfaction after regional plexus anaesthesia is commonly attributed to insufficient anaesthesia at the start of surgery and to prolonged postoperative numbness, both of which are more likely when a block is performed hurriedly on an anxious patient.¹⁷⁻¹⁹

Additional technical factors favoured GA. The supraclavicular approach, which provides dense anaesthesia of the entire hand, may cause ipsilateral phrenic nerve paresis, and block performance and onset add time before incision. In emergency crushed-hand surgery, axillary and supraclavicular blocks are both effective but differ in performance time and complication profile, and either may fail partially, requiring supplementation or conversion to GA. Large registry data from the open treatment of hand fractures show similar 30-day complication and reoperation rates between GA and other anaesthetic techniques, although length of stay tends to be longer after GA. General anaesthesia was therefore a defensible and safe choice, provided that its recognised

disadvantages—aspiration risk, postoperative nausea and vomiting, and the absence of residual analgesia—were actively mitigated.^{9,20,21}

What regional anaesthesia could have added

The benefits foregone by not using a regional technique should be acknowledged. In a randomised trial of ambulatory hand surgery, axillary brachial plexus block reduced early pain scores, opioid consumption and nausea and allowed more patients to bypass the recovery room than GA, although pain and satisfaction were similar from the first postoperative day onwards. In upper-limb trauma surgery specifically, ultrasound-guided axillary block with 20 mL of local anaesthetic provided markedly lower recovery-room pain scores and earlier discharge readiness than a standardised GA. Earlier work also found intravenous regional anaesthesia and axillary block to be associated with faster recovery and lower nursing workload than isoflurane-based GA.^{7,22,23}

Regional anaesthesia is also associated with higher patient satisfaction, a longer duration of analgesia and a shorter hospital stay after upper-limb surgery, and national registry data suggest fewer overall postoperative complications when GA is avoided. With ultrasound guidance, axillary, supraclavicular and infraclavicular approaches achieve comparable surgical anaesthesia, and the choice should be individualised to the patient, the procedure and operator expertise; selective proximal and distal brachial plexus blocks have been reported to reduce intraoperative complications and shorten hospital stay in hand-trauma surgery. In practical terms, when a primary regional technique is not feasible, a single-shot brachial plexus block performed after induction of GA, or wound and digital-nerve infiltration with long-acting local anaesthetic by the surgeon, can capture much of this analgesic benefit.^{8,24–26}

Wide-awake local anaesthesia no tourniquet has gained popularity for hand fracture fixation, offering intraoperative functional assessment, avoidance of tourniquet pain and substantial cost savings, with comparable functional scores and lower early pain than GA in a prospective comparison. Its success, however, depends on patient cooperation, adequate time for adrenaline-induced vasoconstriction and a relatively clean, limited operative field—conditions not met in this anxious patient with a contaminated multi-digit injury.^{10,27}

Airway management in the non-fasted trauma patient

1348

The International Journal of Medical Science and Health Research

For a patient presumed to have a full stomach, rapid sequence induction (RSI) followed by tracheal intubation with a cuffed tube remains the conventional standard. Contemporary RSI has evolved from its original description, with debate over cricoid pressure, the choice of induction and neuromuscular-blocking agents and the role of gentle mask ventilation, but its core principles—rapid securing of a definitive airway and avoidance of aspiration—remain valid. Second-generation supraglottic airway devices, which incorporate a gastric drainage channel, reduce airway complications, sore throat and postoperative nausea compared with tracheal tubes and did not increase clinically relevant regurgitation in elective abdominopelvic surgery; their use in trauma patients should nonetheless be restricted to those judged to be at low aspiration risk. The airway strategy actually employed in this case should be reported explicitly (Table 4), because it is central to the safety argument for GA in emergency hand surgery.^{12,28,29}

Perioperative analgesia and prevention of rebound pain

Because GA provides no residual analgesia, an opioid-sparing multimodal regimen is essential. Combining paracetamol, a non-steroidal anti-inflammatory drug and dexamethasone—agents acting on complementary pain pathways—improves analgesia and reduces opioid consumption and its adverse effects, and multimodal analgesia is recommended by professional societies for orthopaedic and trauma surgery. Concerns regarding bleeding, renal injury, impaired bone healing or infection with these agents are, for short courses in young healthy patients, largely theoretical and should be weighed against their clear analgesic benefit. Regional or local-anaesthetic adjuncts, where feasible, constitute the most effective opioid-sparing component.^{30–32}

If a peripheral nerve block is used, clinicians must anticipate rebound pain—a transition from well-controlled to severe pain as the block resolves—which affected roughly half of ambulatory patients in a large cohort and was independently associated with younger age, bone surgery and the absence of perioperative dexamethasone. Both intravenous and perineural dexamethasone substantially reduce its incidence. In orthopaedic trauma surgery, preoperative moderate-to-severe pain and an elevated NLR were additional risk factors. The present patient—a young man with painful bony injuries and a raised NLR—would have been at high risk of rebound

pain had a block been used, which underlines the need for scheduled systemic analgesia and patient education irrespective of technique.^{16,33,34}

Chronic post-amputation pain

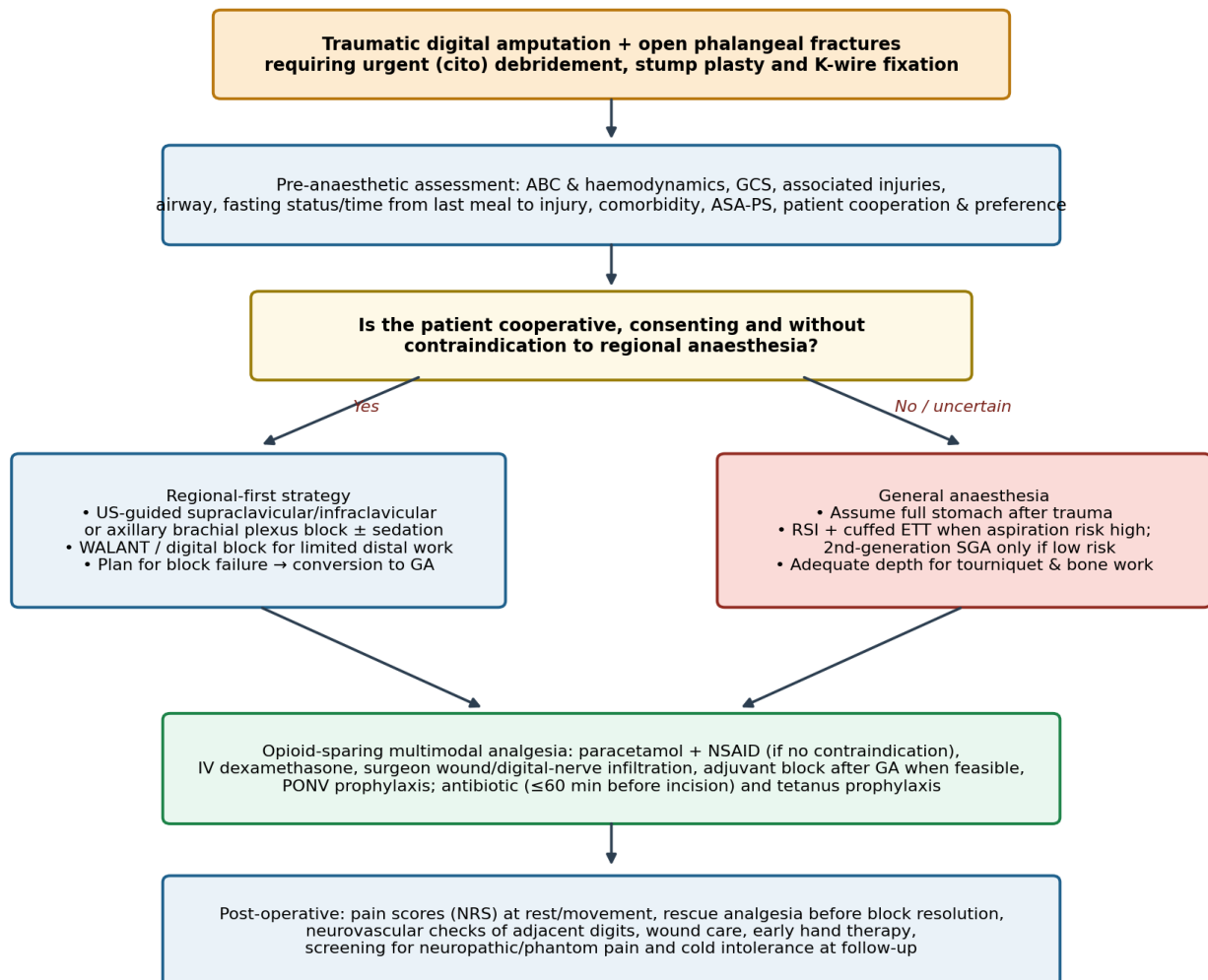
Persistent pain is an under-recognised sequel of finger trauma. At a minimum of one year after finger amputation, about one-third of patients report pain and nearly one in five have neuropathic pain. Surgical preventive techniques at the index operation—such as traction neurectomy with proximal nerve-end placement, centro-central union or epineural ligation—reduce symptomatic neuroma and neuropathic pain after finger amputation from about 8% to 0–3%. Phantom limb pain is reported by roughly six in ten people after amputation overall, with persistent pre-operative pain, stump pain and phantom sensations identified as risk factors.^{35–37}

Severe acute and subacute postoperative pain and psychological factors such as anxiety and depression predict the development of phantom and residual limb pain months after amputation, which suggests that prompt and effective perioperative analgesia is not only humane but may also be preventive. Current recommendations therefore emphasise consistent prevention and treatment of severe postoperative pain, early integration of pharmacological and non-pharmacological measures, and interdisciplinary follow-up. For this patient, structured screening for neuropathic pain, phantom sensations and cold intolerance at outpatient follow-up is recommended.^{6,38,39}

Infection prophylaxis and adjunctive measures

The overall infection rate after open hand fractures is relatively low (about 4–5%), and antibiotic administration is associated with fewer infections, whereas the timing of debridement within the first hours has not been shown to alter infection rates materially. For open distal phalanx fractures, prophylactic antibiotics do not appear to reduce superficial infection, emphasising prompt irrigation and debridement as the primary intervention. In a large open-fracture cohort, ceftriaxone monotherapy offered no advantage over cefazolin for Gustilo–Anderson type I and II fractures; first-generation cephalosporins may therefore be preferable for antimicrobial stewardship, with ceftriaxone acceptable where institutional protocols dictate. Tetanus immunoprophylaxis appropriate to the patient's immunisation history was administered, in keeping with standard management of contaminated wounds.^{40–42}

An integrated, evidence-informed approach to anaesthetic decision-making for emergency finger amputation, synthesised from the literature reviewed above, is proposed in Figure 6. It emphasises pre-anaesthetic assessment of aspiration risk and cooperation, a regional-first strategy when conditions allow, GA with appropriate airway protection when they do not, and a common multimodal analgesic pathway with structured follow-up for chronic pain.^{11,25,30,39}



Author-constructed schematic synthesising the evidence discussed in this report (not a validated guideline).

Figure 6. Proposed decision-making schematic for the anaesthetic management of emergency traumatic finger amputation (author-constructed synthesis of the evidence discussed; not a validated

guideline). ASA-PS, American Society of Anesthesiologists physical status; ETT, endotracheal tube; GA, general anaesthesia; NRS, numerical rating scale; NSAID, non-steroidal anti-inflammatory drug; PONV, postoperative nausea and vomiting; RSI, rapid sequence induction; SGA, supraglottic airway; US, ultrasound; WALANT, wide-awake local anaesthesia no tourniquet.

CONCLUSION

General anaesthesia is a safe and appropriate technique for emergency revision amputation and fixation of associated phalangeal fractures when urgency, limited patient cooperation and the need for an immobile operative field make a regional technique impractical. Its safety depends on treating the trauma patient as having a full stomach, securing the airway accordingly, and compensating for the absence of residual analgesia with an opioid-sparing multimodal regimen. Brachial plexus block, surgeon-administered local anaesthetic infiltration or WALANT should be considered whenever feasible, either as the primary technique or as an adjunct, and patients should be followed up for neuropathic and phantom pain after digital amputation.^{7,28,30,35}

Learning Points

- Emergency hand-trauma patients should be presumed to have a full stomach; fasting time is a poor surrogate for gastric emptiness, and gastric ultrasound, when available, can refine risk.^{11,15}
- Brachial plexus block offers superior early analgesia and recovery, but general anaesthesia is a valid choice when urgency, anxiety or poor cooperation preclude a reliable awake technique.^{7,17}
- When general anaesthesia is used, multimodal analgesia (paracetamol, NSAID, dexamethasone) and local-anaesthetic adjuncts should compensate for the lack of residual analgesia.^{30,32}
- If a block is used, anticipate rebound pain, particularly in young patients undergoing bone surgery; intravenous dexamethasone reduces its incidence.^{33,34}
- Neuropathic and phantom pain are common after finger amputation; preventive surgical nerve management and structured follow-up are recommended.^{35,36}

REFERENCES

1. Mayrhofer-Schmid M, et al. Analysis of epidemiology, etiology and injury patterns in 2,179 digit amputations. Sci Rep. 2025. doi:10.1038/s41598-025-18983-y. Available from: https://consensus.app/papers/details/2f41455e324a5c0ebec7e7d0bb8b49a1/?utm_source
2. Albarr A, et al. Epidemiology, classification, etiology, complications, and treatments of finger traumatic amputation: a literature review. World J Adv Res Rev. 2025. doi:10.30574/wjarr.2025.25.1.0009. Available from: https://consensus.app/papers/details/f798d04fd33354f6a02c595fa0fab69b/?utm_source
3. Pomares G, et al. Epidemiology of traumatic upper limb amputations. Orthop Traumatol Surg Res. 2018. doi:10.1016/j.otsr.2017.12.014. Available from: https://consensus.app/papers/details/b074c4543a295d3282790b2d77435eb3/?utm_source
4. Zhu H, et al. Contribution of revision amputation vs replantation for certain digits to functional outcomes after traumatic digit amputations: a comparative study based on multicenter prospective cohort. Int J Surg. 2021. doi:10.1016/j.ijsu.2021.106164. Available from: https://consensus.app/papers/details/34fad1fb467750cf8027c942981f7497/?utm_source
5. Chung KC, et al. Patient-reported and functional outcomes after revision amputation and replantation of digit amputations: the FRANCHISE multicenter international retrospective cohort study. JAMA Surg. 2019. doi:10.1001/jamasurg.2019.0418. Available from: https://consensus.app/papers/details/fe615642d5cf5f7882da0b020ac238b3/?utm_source
6. Yuan F, et al. A systematic review of outcomes after revision amputation for treatment of traumatic finger amputation. Plast Reconstr Surg. 2015. doi:10.1097/PRS.0000000000001487. Available from: https://consensus.app/papers/details/f7d0cf71e96e5dedb2f86f89b67fe16b/?utm_source
7. McCartney CJL, et al. Early but no long-term benefit of regional compared with general anesthesia for ambulatory hand surgery. Anesthesiology. 2004. doi:10.1097/00000542-200408000-00028. Available from: https://consensus.app/papers/details/472b8ae460ac529293bd69d04b0ed5b5/?utm_source

8. Hustedt JW, et al. Comparison of postoperative complications associated with anesthetic choice for surgery of the hand. J Hand Surg Am. 2017. doi:10.1016/j.jhsa.2016.10.007. Available from: https://consensus.app/papers/details/1329f8d2ffe756888bfd291e6b1cfb59/?utm_source
9. DalCortivo RL, et al. Anesthesia type and short-term outcomes in open treatment of hand fractures. Arch Bone Jt Surg. 2024. doi:10.22038/abjs.2024.67440.3200. Available from: https://consensus.app/papers/details/38ec4d4fcc92548ca44f9922e8c7c5c9/?utm_source
10. Shadid O, et al. Hand surgery anaesthesia innovations: balancing efficiency, cost, and comfort with WALANT, ultrasound, and emerging adjuncts—a narrative review. J Clin Med. 2025. doi:10.3390/jcm14176146. Available from: https://consensus.app/papers/details/714a5c1f3622545ab186f0afac81e746/?utm_source
11. Godschalx V, et al. The role of gastric ultrasound in anaesthesia for emergency surgery. Eur J Anaesthesiol Intensive Care. 2023. doi:10.1097/EA9.000000000000027. Available from: https://consensus.app/papers/details/353e4a2e83f657f98edcd0d00559a24b/?utm_source
12. Sun J, et al. Perioperative pulmonary aspiration and regurgitation without aspiration in adults: a retrospective observational study of 166,491 anesthesia records. Ann Palliat Med. 2021. doi:10.21037/apm-20-2382. Available from: https://consensus.app/papers/details/69cbbbc307b158dbb6589fcc68c6ae86/?utm_source
13. Záhorec R. Neutrophil-to-lymphocyte ratio, past, present and future perspectives. Bratisl Lek Listy. 2021. doi:10.4149/BLL_2021_078. Available from: https://consensus.app/papers/details/eacaf79132a85038b060dcd205067e07/?utm_source
14. Wang Q, et al. Reference range of neutrophil-to-lymphocyte ratio in healthy individuals and its predictive value for post-trauma nosocomial infections. Front Cell Infect Microbiol. 2025. doi:10.3389/fcimb.2025.1529532. Available from: https://consensus.app/papers/details/89897bd1a0e15e0b957797012d11fe14/?utm_source
15. Baettig SJ, et al. Pre-operative gastric ultrasound in patients at risk of pulmonary aspiration: a prospective observational cohort study. Anaesthesia. 2023. doi:10.1111/anae.16117. Available from: https://consensus.app/papers/details/2f776aef1ab853c8b38f72c7d5671a28/?utm_source

16. Wang YM, et al. Factors associated with postoperative rebound pain after peripheral nerve block anaesthesia for orthopedic trauma surgery: a retrospective cohort analysis. J Orthop Surg Res. 2025. doi:10.1186/s13018-025-06339-1. Available from: https://consensus.app/papers/details/c963f24cd228576bb70db224a4ad0b99/?utm_source
17. Lavado J, et al. General or regional? Exploring patients' anaesthetic preferences and perception of regional anaesthesia. Rev Esp Anesthesiol Reanim (Engl Ed). 2019. doi:10.1016/j.redare.2018.12.005. Available from: https://consensus.app/papers/details/b6936b407a4f5f38b49b077f4750fda2/?utm_source
18. O'Donnell B, et al. A cross-sectional survey of anaesthesia-related expectations amongst patients awaiting upper limb trauma surgery. Rom J Anaesth Intensive Care. 2017. doi:10.21454/rjaic.7518.242.bdo. Available from: https://consensus.app/papers/details/b89f3d34e623512fab75cf46f6dbf067/?utm_source
19. Droog W, et al. Regional anaesthesia is associated with less patient satisfaction compared to general anaesthesia following distal upper extremity surgery: a prospective double centred observational study. BMC Anesthesiol. 2019. doi:10.1186/s12871-019-0789-4. Available from: https://consensus.app/papers/details/61cda8b40d1b580682bdcd9001f03fb2/?utm_source
20. Mirsch D, et al. Just the facts: brachial plexus blocks for upper extremity injuries in the emergency department. CJEM. 2023. doi:10.1007/s43678-023-00628-6. Available from: https://consensus.app/papers/details/80dcec030d395b6a937340fac2721812/?utm_source
21. Hussien R, et al. Ultrasound guided axillary brachial plexus block versus supraclavicular block in emergency crushed hand patients: a comparative study. Open Anesth J. 2018. doi:10.2174/2589645801812010034. Available from: https://consensus.app/papers/details/4e90a8d898485c6496f0c6afbc6049c9/?utm_source
22. O'Donnell B, et al. Ultrasound-guided axillary brachial plexus block with 20 milliliters local anesthetic mixture versus general anesthesia for upper limb trauma surgery: an observer-blinded, prospective, randomized, controlled trial. Anesth Analg. 2009. doi:10.1213/ane.0b013e3181a3e721. Available from: https://consensus.app/papers/details/d957a98bc41350259f035448e1a6a76c/?utm_source

23. Chan VWS, et al. A comparative study of general anesthesia, intravenous regional anesthesia, and axillary block for outpatient hand surgery: clinical outcome and cost analysis. *Anesth Analg.* 2001. doi:10.1097/00000539-200111000-00025. Available from: https://consensus.app/papers/details/9aebc559ce485ba984632eaf8f294b7d/?utm_source
24. Suresh P, et al. Patient satisfaction with regional anaesthesia and general anaesthesia in upper limb surgeries: an open label, cross-sectional, prospective, observational clinical comparative study. *Indian J Anaesth.* 2021. doi:10.4103/ija.ija_1121_20. Available from: https://consensus.app/papers/details/fc5fb8c94f7359a78597f9ea491fd143/?utm_source
25. Nijs K, et al. Axillary brachial plexus block compared with other regional anesthesia techniques in distal upper limb surgery: a systematic review and meta-analysis. *J Clin Med.* 2024. doi:10.3390/jcm13113185. Available from: https://consensus.app/papers/details/fed96011feab5335a77374823a233487/?utm_source
26. Zhang J, et al. Clinical application of ultrasound-guided selective proximal and distal brachial plexus block in rapid rehabilitation surgery for hand trauma. *World J Clin Cases.* 2020. doi:10.12998/wjcc.v8.i11.2137. Available from: https://consensus.app/papers/details/ada53cc80650541dbaaf6108b6bac625/?utm_source
27. Abdullah S, et al. A prospective study comparing wide-awake local anesthesia no tourniquet versus general anesthesia in hand fracture fixation. *J Hand Surg Glob Online.* 2024. doi:10.1016/j.jhsg.2024.06.008. Available from: https://consensus.app/papers/details/8a93adfd54d85dce8edc9c2c728565b7/?utm_source
28. Avery P, et al. Rapid sequence induction: where did the consensus go? *Scand J Trauma Resusc Emerg Med.* 2021. doi:10.1186/s13049-021-00883-5. Available from: https://consensus.app/papers/details/7a3d8739435d59168d0824daa2d7f113/?utm_source
29. de Carvalho CC, et al. Second-generation supraglottic airway devices versus endotracheal intubation in adults undergoing abdominopelvic surgery: a systematic review and meta-analysis. *Anesth Analg.* 2024. doi:10.1213/ANE.0000000000006951. Available from: https://consensus.app/papers/details/fbbb70e89ee8518e918ff2af1101695d/?utm_source

30. Helander EM, et al. Multimodal analgesia, current concepts, and acute pain considerations. Curr Pain Headache Rep. 2017. doi:10.1007/s11916-017-0607-y. Available from: https://consensus.app/papers/details/8dd489dea3b55f769c43d7400d98a2fe/?utm_source
31. Chunduri A, et al. Multimodal pain management in orthopedic surgery. J Clin Med. 2022. doi:10.3390/jcm11216386. Available from: https://consensus.app/papers/details/97c0ff44a180586d99797c0bb46fac09/?utm_source
32. Hong B, et al. Balancing benefit and risk: clinical considerations in the use of acetaminophen, non-steroidal anti-inflammatory drugs, and dexamethasone for perioperative multimodal analgesia. Korean J Pain. 2025. doi:10.3344/kjp.25068. Available from: https://consensus.app/papers/details/d54d7ffdefbc5872b2b8a59ad8c0244d/?utm_source
33. Barry GS, et al. Factors associated with rebound pain after peripheral nerve block for ambulatory surgery. Br J Anaesth. 2021;126:862–71. doi:10.1016/j.bja.2020.10.035. Available from: https://consensus.app/papers/details/b7b30213f31b50e9bcadf64a7bb78cb6/?utm_source
34. Singh NP, et al. Prophylactic dexamethasone for rebound pain after peripheral nerve block in adult surgical patients: systematic review, meta-analysis, and trial sequential analysis of randomised controlled trials. Br J Anaesth. 2023. doi:10.1016/j.bja.2023.09.022. Available from: https://consensus.app/papers/details/1f4b89d60fd15634b6f208b32133e325/?utm_source
35. de Lange JD, et al. Prevalence of post-traumatic neuropathic pain after digital nerve repair and finger amputation. J Plast Reconstr Aesthet Surg. 2022. doi:10.1016/j.bjps.2022.06.033. Available from: https://consensus.app/papers/details/939a8004a1d652519fd3231f80e1b491/?utm_source
36. Hundepool CA, et al. Prevention is better than cure: surgical methods for neuropathic pain prevention following amputation – a systematic review. J Plast Reconstr Aesthet Surg. 2021. doi:10.1016/j.bjps.2021.11.076. Available from: https://consensus.app/papers/details/2458f7e4f9b854f1a4c5c33f0fb42163/?utm_source
37. Limakatso K, et al. The prevalence and risk factors for phantom limb pain in people with amputations: a systematic review and meta-analysis. PLoS One. 2020;15:e0240431.

- doi:10.1371/journal.pone.0240431. Available from:
https://consensus.app/papers/details/025dae3a32725640a1b09ee9cd0bdb4e/?utm_source
38. Larbig W, et al. Pre- and postoperative predictors of phantom limb pain. Neurosci Lett. 2019. doi:10.1016/j.neulet.2018.11.044. Available from:
https://consensus.app/papers/details/0e811cc41687543587d3c091d6996df6/?utm_source
39. Erlenwein J, et al. Clinical updates on phantom limb pain. Pain Rep. 2021. doi:10.1097/PR9.0000000000000888. Available from:
https://consensus.app/papers/details/ae067f01131d5e91b339e22fac131b84/?utm_source
40. Ketonis C, et al. Timing of debridement and infection rates in open fractures of the hand: a systematic review. Hand (N Y). 2017. doi:10.1177/1558944716643294. Available from:
https://consensus.app/papers/details/d0e0615c8ce95a5d91bea23545fa548f/?utm_source
41. Metcalfe D, et al. Prophylactic antibiotics in open distal phalanx fractures: systematic review and meta-analysis. J Hand Surg Eur Vol. 2016. doi:10.1177/1753193415601055. Available from: https://consensus.app/papers/details/f6fc3ac7e03a5ca9ba4593cac65bdaf9/?utm_source
42. Lin CA, et al. Outcomes associated with choice of prophylactic antibiotics in open fractures. J Bone Joint Surg Am. 2025. doi:10.2106/JBJS.24.01123. Available from:
https://consensus.app/papers/details/d3c6df589bc75fb399b5096f27311aa6/?utm_source