



Relevance of Cold Steel Tonsillectomy in the Modern Surgical Era: A Case Series of Four Patients with Evaluation of Postoperative Pain and Clinical Outcomes

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Abstract

Background: Cold steel dissection tonsillectomy represents the oldest and most widely practiced technique in otorhinolaryngology. Despite the proliferation of energy-based modalities, cold steel dissection continues to be utilized in resource-limited tertiary referral centers, particularly in low- and middle-income countries (LMICs). **Objective:** To document and evaluate the perioperative safety profile and short-term clinical outcomes of cold steel dissection tonsillectomy in four consecutive patients at RS Bintang Amin, Bandar Lampung, Indonesia. **Case Presentations:** Four patients (age range 11–27 years; 3 females, 1 male) underwent cold steel dissection tonsillectomy or combined tonsilloadenoidectomy under general anesthesia (June 9–23, 2026). Indications included bilateral tonsillar hypertrophy grade T3–T4, chronic recurrent tonsillitis, halitosis, and sleep-disordered breathing. No intraoperative complications or immediate hemorrhage occurred. **Discussion:** Current evidence confirms that cold steel dissection produces secondary hemorrhage rates significantly lower than hot dissection techniques, with bipolar diathermy carrying an odds ratio of 2.47 compared to cold steel in the National Prospective Tonsillectomy Audit (n = 40,514). Multimodal analgesia combining paracetamol, NSAIDs, and corticosteroids provided effective postoperative pain control. **Conclusion:** Cold steel dissection tonsillectomy remains clinically relevant, safe, and effective in the modern surgical era, particularly in LMIC settings.

Keywords: Chronic Tonsillitis; Cold Steel Tonsillectomy; Postoperative Hemorrhage; Sleep-Disordered Breathing; Tonsillar Hypertrophy

Introduction

Tonsillectomy, defined as the complete extracapsular excision of the palatine tonsil inclusive of its fibrous capsule from the peritonsillar space, remains one of the most frequently performed surgical procedures in otorhinolaryngology worldwide across both pediatric and adult populations. Obstructive sleep-disordered breathing (oSDB) and recurrent acute tonsillitis represent the two primary indications for this intervention, driving substantial surgical volumes globally (Russo *et al.*, 2023). In modern clinical practice, optimizing the perioperative safety profile and mitigating post-tonsillectomy morbidity—specifically hemorrhage and severe postoperative pain—continue to be the central focuses of surgical technique refinement (Russo *et al.*, 2023).

Cold steel dissection tonsillectomy—performed using a scalpel, periosteal elevator, and Boyle-Davis mouth gag, with hemostasis achieved via suture ligation or ties—represents the historical gold standard against which all subsequent modalities are compared. Despite the proliferation of energy-based technologies over the past three decades, including coblation, bipolar electrocautery, monopolar diathermy, harmonic scalpel, and laser systems, cold steel dissection remains widely practiced globally. A multinational quality register analysis encompassing 31,632 tonsil surgery procedures across Sweden, Norway, and Denmark confirmed that cold steel dissection remains the technique of choice for tonsillectomy in all three Nordic countries (Stalfors *et al.*, 2022).

Historically, large-scale epidemiological audits encompassing over 40,000 patients established that traditional cold steel dissection yielded the lowest postoperative hemorrhage rates compared to thermal energy-based techniques. This classical risk profile continues to be validated by recent network meta-analyses and contemporary clinical trials, which confirm the superior safety parameters of cold steel instruments regarding secondary bleeding and tissue trauma (Russo *et al.*, 2023).

The comparative morbidity of tonsillectomy techniques remains a critical point of clinical evaluation. Recent evidence from comprehensive network meta-analyses indicates that traditional cold steel dissection demonstrates a significantly superior safety profile regarding secondary hemorrhage and tissue trauma compared to high-thermal energy modalities (Russo *et al.*, 2023). Furthermore, contemporary prospective randomized controlled trials in pediatric cohorts confirm that cold dissection techniques yield highly favorable postoperative pain outcomes with minimal risk of primary hemorrhagic complications (Aytac *et al.*, 2025).

Clinically, tonsillar hypertrophy (Brodsky grades T3–T4) serves as a primary etiology for obstructive sleep-disordered breathing (oSDB) and habitual snoring in both pediatric and young adult populations. Recent randomized clinical trials confirm that early surgical intervention via adenotonsillectomy drastically reduces long-term healthcare utilization and morbidity in children presenting with sleep-disordered breathing compared to conservative watchful waiting (Bakker *et al.*, 2025). For adult patients suffering from recurrent acute infections, immediate tonsillectomy has been definitively established by multi-center trials as a cost-effective intervention that significantly reduces sore throat days and improves quality of life parameters compared to conservative management (Wilson *et al.*, 2023). In Indonesian regional referral hospitals, where energy-based surgical devices are frequently unavailable or cost-prohibitive, cold steel dissection represents not merely a historical preference but a clinical necessity, making modern evidence-based validation of its application imperative.

Research Objectives

The primary objective of this case series is to document and critically evaluate the perioperative safety profile and short-term clinical outcomes of cold steel dissection tonsillectomy in four consecutive patients presenting with symptomatic tonsillar disease at RS Bintang Amin, Bandar Lampung, Indonesia. Secondary objectives are to: (a) synthesize current evidence on the comparative efficacy and safety of cold steel tonsillectomy versus alternative surgical modalities; (b) analyze preoperative laboratory and radiological parameters as determinants of surgical eligibility; and (c) reinforce the argument for continued utility of cold steel dissection in LMIC ENT practice through current literature evidence and high-quality validated trials (Aytac *et al.*, 2025; Russo *et al.*, 2023).

Research Gap and Novelty

While large multicenter trials comparing tonsillectomy techniques have been conducted predominantly in Western and high-income settings, data from LMIC institutions—particularly in Southeast Asia—documenting real-world outcomes of cold steel tonsillectomy across a heterogeneous pediatric and adult cohort within a single institutional case series remain sparse. Existing comparative studies tend to focus on single surgical indications and homogeneous age groups, creating a gap in the literature regarding outcomes across patients with mixed pathology. The novelty of this report lies in: (a) the multi diagnostic, cross-age cohort (11–27 years); (b) documentation of combined tonsilloadenoidectomy outcomes alongside isolated tonsillectomy within the same institutional context; (c) the clinical

contextualization of incidental thoracic scoliosis identified in three of four preoperative chest radiographs; and (d) a comprehensive discussion grounded in recent high-quality references spanning 2004–2026, with active peer-reviewed citations provided for each core clinical claim.

Case Presentations

Institutional Setting and Surgical Protocol

All four cases were managed at the Outpatient and Inpatient Otorhinolaryngology–Head and Neck Surgery Service, RS Bintang Amin, under the care of otolaryngologist. Surgical procedures were performed in the institutional operating theater under general anesthesia. All patients or their legal guardians provided written informed consent. Preoperative multidisciplinary clearance was obtained from Pediatrics and Anesthesiology for each case. The perioperative pharmacological protocol—prophylactic ceftriaxone, methylprednisolone, and tranexamic acid—was applied uniformly across all cases, consistent with current evidence supporting corticosteroids for postoperative nausea and pain reduction (Aldamluji *et al.*, 2020) and antifibrinolytic agents for intraoperative blood loss reduction (Smaily *et al.*, 2024).

The cold steel dissection technique employed a Boyle-Davis mouth gag for oral access, a periosteal elevator for tonsil mobilization from capsular attachments, curved scissors and a tonsil snare for excision, and chromic catgut or silk suture ligation for hemostatic control. Adenoid curettage in Case 3 was performed using an adenotome following bilateral tonsillectomy.

Table 1: Summary of Case Series: Patient Demographics, Diagnosis, and Procedures

Parameter	Case 1	Case 2	Case 3	Case 4	Note
Patient	ARK	MA	APPS	BB	—
Age	11 yr 9 months	11 yr 7 months	27 yr 2 months	12 yr 3 months	—
Sex	Female	Male	Female	Male	3F : 1M
Diagnosis	T4/T4 Hypertrophy	T4/T4 + Susp. Adenoid	Chr. Tonsillitis T3/T3 + Adenoid Hypertrophy	Chr. Tonsillitis T4	—
Procedure	Tonsillectomy	Tonsillectomy	Tonsillectomy + Adenoidectomy	Tonsillectomy	All cold steel
Surgery Date	13 Jun 2026	23 Jun 2026	20 Jun 2026	10 Jun 2026	—
Anesthesia	GA	GA	GA	GA	—
Intraoperative Blood Loss	0 cc	Not recorded	0 cc	Not recorded	—
Intraoperative Complications	None	None	None	None	—
ICD-10 Code	J35.1	J35.1	J35.0 / J35.2	J35.0	—

Note. GA = general anesthesia; chr. = chronic; susp. = suspected.

Case 1: ARK — Tonsillar Hypertrophy T4/T4

Patient History and Physical Examination

A female patient, 11 years and 9 months of age, was referred from Rumah Sakit Bintang Amin (RSBA) and presented to the ENT outpatient clinic on June 10, 2026. The patient's parents reported progressive odynophagia leading to impaired oral alimentation and habitual nocturnal snoring suggestive of sleep-disordered breathing. No history of drug allergies was noted. Insurance coverage: BPJS Class I.

Vital signs: heart rate 90 beats per minute; respiratory rate 20 breaths per minute; temperature 36.5°C; weight 31 kg. ENT examination revealed bilateral palatine tonsils grade T4/T4 on the Brodsky scale, occupying greater than 75% of the oropharyngeal airway with near-complete midline approximation—consistent with the criteria for tonsillar hypertrophy as a primary indication for tonsillectomy.

Preoperative Laboratory Findings

Vital signs: heart rate 90 beats per minute; respiratory rate 20 breaths per minute; temperature 36.5°C; weight 31 kg. ENT examination revealed bilateral palatine tonsils grade T4/T4 on the Brodsky scale,

occupying greater than 75% of the oropharyngeal airway with near-complete midline approximation—consistent with the criteria for tonsillar hypertrophy as a primary indication for tonsillectomy.

Preoperative laboratory evaluation conducted on June 12, 2026, demonstrated a mild reduction in hemoglobin (Hb) at 11.4 g/dL (reference range: 12.3–15.3 g/dL), while the hematocrit (Ht) level was at the lower normal limit of 35% (reference range: 35–47%). Erythrocyte (RBC) count and mean corpuscular volume (MCV) were within normal physiological limits at $4.2 \times 10^6/\mu\text{L}$ (reference range: $4.0\text{--}5.1 \times 10^6/\mu\text{L}$) and 84 fL (reference range: 80–96 fL), respectively. However, red blood cell indices revealed mild reductions in both mean corpuscular hemoglobin (MCH) at 27 pg (reference range: 28–33 pg) and mean corpuscular hemoglobin concentration (MCHC) at 32 g/dL (reference range: 33–36 g/dL).

The remaining hematological and biochemical profiles were completely unremarkable. Thrombocytes were well within the normal distribution at $398,000/\mu\text{L}$ (reference range: 150,000–450,000/ μL). The total leukocyte (WBC) count was normal at $5,890/\mu\text{L}$ (reference range: 4,400–11,300/ μL), supported by a balanced differential count showing 51% neutrophils (reference range: 50–70%) and 35% lymphocytes (reference range: 25–40%). Crucially for surgical clearance, coagulation profiles were within normal limits, with a clotting time (CT) of 12 minutes (reference range: 9–15 minutes) and a bleeding time (BT) of 3 minutes (reference range: 1–7 minutes). Additionally, random blood glucose was normal at 104 mg/dL (reference range: < 200 mg/dL), and HBsAg Rapid screening was non-reactive. Overall, all laboratory parameters remained within acceptable thresholds for elective surgery, satisfying the prerequisites of an Hb ≥ 10 g/dL and CT/BT within normal reference frames.

Radiological and Perioperative Management

Preoperative chest radiograph (posteroanterior projection, June 12, 2026): trachea midline; mediastinum not widened; cardiac silhouette within normal limits (cardiothoracic ratio < 50%); bilateral lung fields without infiltrate or consolidation. Skeletal finding: mild scoliosis of the thoracic vertebral column (incidental). No contraindication to general anesthesia was identified.

Diagnosis: ICD-10 J35.1 (hypertrophy of tonsils). Preoperative multidisciplinary clearance was successfully obtained from Pediatrics and Anesthesiology. The preoperative pharmacological protocol was administered as follows: Ceftriaxone sodium 500 mg IV (single prophylactic dose), methylprednisolone 1/3 ampule IV for airway edema and emesis mitigation (Aldamluji *et al.*, 2020), and tranexamic acid 250 mg IV for antifibrinolytic hemostatic optimization (Smailly *et al.*, 2024). Procedure: cold steel dissection tonsillectomy, June 13, 2026, 09:00 WIB. Clinical documentation of the intraoperative procedure and subsequent postoperative evaluation for Case 1 is illustrated in Figure 1.

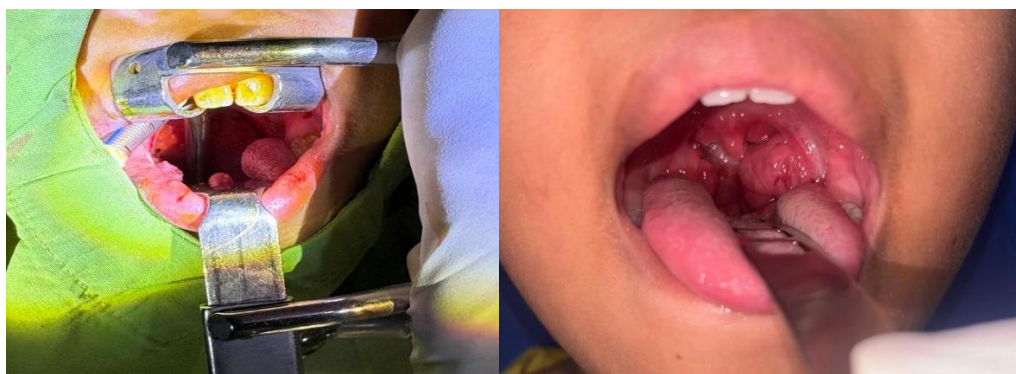


Figure 1. Intraoperative and Postoperative Clinical Documentation of Case 1 (ARK). (A) Intraoperative During General Anesthesia Using a Boyle-Davis Mouth Gag, Captured Immediately Prior to the Cold Steel Extracapsular Dissection, Highlighting the Extensive Volume of the Obstructing Tonsillar Tissue. (B) Postoperative Oropharyngeal Evaluation Demonstrates a Completely Patent Airway with Healthy Mucosal Healing of the Tonsillar Pillars Following the Removal of the Bilateral T4/T4 Tonsillar Hypertrophy

Case 2: MA— Tonsillar Hypertrophy T4/T4 With Suspected Adenoid Hypertrophy

Patient History and Physical Examination

A male patient, 11 years and 7 months of age, was referred from Puskesmas and presented on June 22, 2026. Chief complaints: habitual nocturnal snoring and recurrent odynophagia. Weight 56 kg; height 145 cm; BMI 26.6 kg/m² (overweight—a recognized risk factor that may compound oSDB severity). Vital signs: heart rate 98 beats per minute; respiratory rate 20 breaths per minute; temperature 36°C. ENT examination: bilateral tonsils T4/T4; suspected adenoid hypertrophy based on habitual mouth breathing and nasal obstruction.

Preoperative Laboratory Findings

Preoperative laboratory evaluation conducted on June 22, 2026, demonstrated a hemoglobin (Hb) level of 13.8 g/dL, which was mildly below the adult reference range (14.5–17.5 g/dL) but considered age-appropriate for the patient. The hematocrit (Ht) and erythrocyte (RBC) counts were within normal physiological limits at 43% (reference range: 42–52%) and $5.5 \times 10^6/\mu\text{L}$ (reference range: $4.5\text{--}5.9 \times 10^6/\mu\text{L}$), respectively. However, red blood cell indices revealed a mild microcytic-hypochromic pattern, characterized by a mildly reduced MCV of 78 fL (reference range: 80–96 fL), a mildly reduced MCH of 26 pg (reference range: 28–33 pg), and a reduced MCHC of 31 g/dL (reference range: 33–36 g/dL), which collectively suggested underlying iron deficiency anemia.

The remaining hematological and biochemical parameters were completely unremarkable, with thrombocytes at 414,000/ μL (reference range: 150,000–450,000/ μL) and leukocytes (WBC) at 9,210/ μL (reference range: 4,400–11,300/ μL). The white blood cell differential count showed a normal distribution of 68% neutrophils (reference range: 50–70%) and 26% lymphocytes (reference range: 25–40%). Hemostatic parameters were entirely within normal limits, yielding a clotting time (CT) of 11 minutes (reference range: 9–15 minutes) and a bleeding time (BT) of 2 minutes (reference range: 1–7 minutes). Additionally, the random blood glucose level was normal at 86 mg/dL (reference range: < 200 mg/dL), and the HBsAg Rapid screening was non-reactive.

Preoperative chest radiograph (June 22, 2026): mild thoracic scoliosis (incidental); no cardiac or pulmonary pathology. Diagnosis: ICD-10 J35.1 (hypertrophy of tonsils) with suspected adenoid hypertrophy. Preoperative multidisciplinary clearance was successfully obtained from Pediatrics and Anesthesiology.

The preoperative pharmacological protocol was administered as follows: ceftriaxone 750 mg IV (single prophylactic dose), methylprednisolone ½ ampule IV for airway edema and emesis mitigation (Aldamluji *et al.*, 2020), and tranexamic acid 500 mg IV for antifibrinolytic hemostatic optimization (Smailly *et al.*, 2024). Procedure: cold steel dissection tonsillectomy, June 23, 2026, 10:00 WIB. The preoperative obstructive severity and corresponding intraoperative environment for Case 2 are documented in Figure 2.

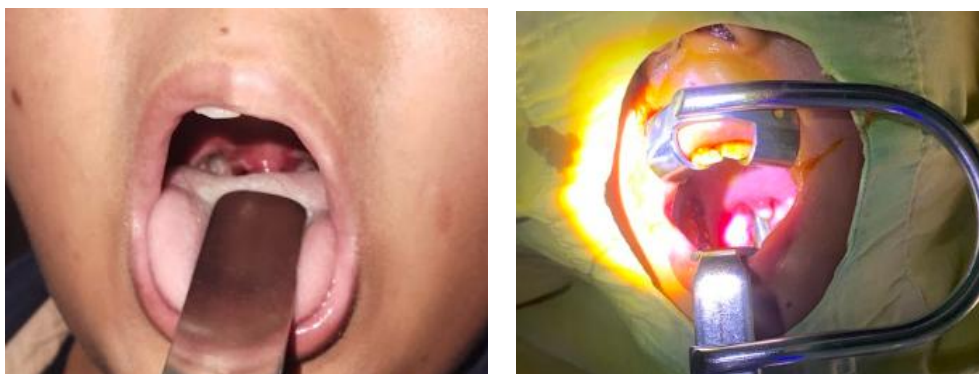


Figure 2. Preoperative and Intraoperative Clinical Images of Case 2 (MA). (A) Preoperative Clinical View Shows Marked Bilateral Palatine Tonsillar Hypertrophy (Brotsky Grade T4/T4) Severely Restricting the Oropharyngeal Airway Space. (B) Intraoperative Visualization During the Surgical Procedure Under General Anesthesia, with Optimal Surgical Field Exposure

Maintained Via a Boyle-Davis Mouth Gag, Showing the Clearance of the Pharyngeal Obstruction

Case 3: APPS — Chronic Recurrent Tonsillitis T3/T3 With Adenoid Hypertrophy, Combined Tonsilloadenoidectomy

Patient History and Physical Examination

A female patient, 27 years and 2 months of age, presented to the ENT outpatient clinic on June 19, 2026. This is the only adult case in the series. Chief complaints: recurrent odynophagia consistent with chronic recurrent tonsillitis, habitual nocturnal snoring, and halitosis (foetor ex ore). Insurance: BPJS Class II. Vital signs: blood pressure 120/80 mmHg; heart rate 80 beats per minute; respiratory rate 20 breaths per minute; temperature 36.0–36.9°C. ENT examination: bilateral tonsils T3/T3; tonsillar crypts with inspissated debris; halitosis present. Diagnosis: chronic tonsillitis (J35.0) + adenoid hypertrophy (J35.2).

Preoperative Laboratory Findings

Preoperative laboratory evaluation conducted on June 19, 2026, revealed a normal hematological profile, with a hemoglobin (Hb) level of 13.5 g/dL (reference range: 12.3–15.3 g/dL), a hematocrit (Ht) of 42% (reference range: 35–47%), and an erythrocyte (RBC) count of $4.6 \times 10^6/\mu\text{L}$ (reference range: $4.1\text{--}5.0 \times 10^6/\mu\text{L}$). Red blood cell indices were also largely within normal physiological parameters, demonstrating a mean corpuscular volume (MCV) of 91 fL (reference range: 80–96 fL) and a mean corpuscular hemoglobin (MCH) of 29 pg (reference range: 28–33 pg). However, the mean corpuscular hemoglobin concentration (MCHC) showed a mild reduction at 32 g/dL (reference range: 33–36 g/dL).

The rest of the laboratory parameters were entirely within normal limits. The thrombocyte count was stable at 325,000/ μL (reference range: 150,000–450,000/ μL), and the total leukocyte (WBC) count was 7,060/ μL (reference range: 4,400–11,300/ μL). The white blood cell differential count was unremarkable, consisting of 66% neutrophils (reference range: 50–70%) and 25% lymphocytes (reference range: 25–40%). Crucially, coagulation parameters demonstrated adequate hemostatic function, yielding a clotting time (CT) of 12 minutes (reference range: 9–15 minutes) and a bleeding time (BT) of 3 minutes (reference range: 1–7 minutes). Additionally, the patient's random blood glucose level was normal at 122 mg/dL (reference range: < 200 mg/dL), and the HBsAg Rapid screening was non-reactive.

Radiological Findings and Operative Report

Preoperative chest radiograph: trachea midline; cardiac silhouette normal (CTR < 50%); bilateral lung fields without opacification; curvature of the thoracic vertebral column exceeding 40 degrees. Impression: cor and pulmo within normal limits; severe scoliosis of the thoracic vertebral column (Cobb angle > 40°). This finding represented the most clinically significant skeletal incidental discovery in the series and was actively flagged for postoperative orthopedic referral.

Operative report (June 20, 2026, 09:00–09:50 WIB): Surgical procedures were performed under general anesthesia with comprehensive multidisciplinary clearance. Following induction, the operative field was disinfected and a Boyle-Davis mouth gag was placed. Bilateral tonsils were excised via cold steel extracapsular dissection; hemostasis was secured via clamp and suture ligation. Adenoid curettage was subsequently performed using an adenotome, and nasopharyngeal hemostasis was achieved using direct gauze pressure.

Total operative duration was 50 minutes with an intraoperative blood loss of 0 cc. No surgical implants were used, no blood transfusions were required, and no intraoperative or immediate postoperative complications occurred. The preoperative pharmacological protocol was administered as follows: ceftriaxone 1 gram IV (single prophylactic dose), methylprednisolone ½ ampule IV for airway edema and emesis mitigation (Aldamluji *et al.*, 2020), and tranexamic acid 500 mg IV for antifibrinolytic hemostatic optimization (Smaily *et al.*, 2024). The pre-surgical oropharyngeal presentation and immediate intraoperative outcome for Case 3 are illustrated in Figure 3.



Figure 3: Preoperative and Immediate Intraoperative Clinical Presentation of Case 3 (APPS). (A) Preoperative Oropharyngeal Evaluation Demonstrates Chronic Bilateral Palatine Tonsillar Hypertrophy Graded as Brodsky T3/T3, Significantly Narrowing the Posterior Pharyngeal Space. (B) Immediate Post-Tonsillectomy Intraoperative View Obtained Under General Anesthesia Using a Boyle-Davis Mouth Gag for Optimal Exposure, Confirming Clean, Well-Healed Tonsillar Beds with Complete Hemostasis and Zero Active Bleeding Prior to Extubation.

Case 4: BB — Chronic Tonsillitis T4 With Documented Postoperative Follow-Up

Patient History and Physical Examination

A male patient, 12 years and 3 months of age, was referred from a primary care facility and presented on June 9, 2026. This case represents the only report in this series with a documented postoperative Day 1 clinical assessment. Chief complaints: nocturnal snoring with frequent arousals, excessive halitosis, and recurrent odynophagia. Insurance coverage: BPJS Class III. Vital signs: blood pressure 125/70 mmHg; heart rate 75 beats per minute; respiratory rate 20 breaths per minute; temperature 36.5°C. ENT examination: bilateral tonsils T4 on the Brodsky scale, presenting near-complete oropharyngeal airway obstruction. Diagnosis: chronic tonsillitis (ICD-10 J35.0).

Preoperative Laboratory Findings

Preoperative laboratory evaluation on June 9, 2026, revealed a reduced hemoglobin (Hb) level of 12.4 g/dL (reference range: 14.0–17.5 g/dL), indicating mild anemia, while the hematocrit (Ht) was at the lower normal limit of 40% (reference range: 40–52%). The erythrocyte (RBC) count was at the upper normal limit of $5.9 \times 10^6/\mu\text{L}$ (reference range: $4.5 - 5.9 \times 10^6/\mu\text{L}$). Notably, red blood cell indices demonstrated a significant microcytic-hypochromic pattern, characterized by a significantly reduced MCV of 68 fL (reference range: 80–96 fL), a significantly reduced MCH of 21 pg (reference range: 28–33 pg), and a reduced MCHC of 31 g/dL (reference range: 33–36 g/dL), which is highly consistent with iron-deficiency anemia (IDA). In contrast, all other laboratory parameters were entirely within normal limits. The thrombocyte count was normal at 326,000/ μL (reference range: 150,000–450,000/ μL), and the total leukocyte (WBC) count was 9,870/ μL (reference range: 4,400–11,300/ μL) with a normal differential count of 63% neutrophils and 29% lymphocytes. Crucially for surgical safety, hemostatic parameters were unremarkable, showing a clotting time (CT) of 12 minutes (reference range: 9–15 minutes) and a bleeding time (BT) of 2 minutes (reference range: 1–7 minutes). Random blood glucose was well-controlled at 101 mg/dL (reference range: < 200 mg/dL), and the HBsAg Rapid screening was non-reactive. Overall, the patient successfully met the required elective surgical thresholds, maintaining an Hb ≥ 10 g/dL and normal CT/BT values.

Perioperative Management and Postoperative Day 1 Assessment

Preoperative chest radiograph (June 9, 2026): no cardiac or pulmonary pathology; no skeletal abnormality detected. Preoperative multidisciplinary clearance was successfully obtained from Pediatrics and Anesthesiology.

The preoperative pharmacological protocol was administered as follows: ceftriaxone 750 mg in NaCl 100 cc IV drip (following a negative skin test), methylprednisolone ½ ampule IV for airway edema and emesis mitigation (Aldamluji *et al.*, 2020), and tranexamic acid 250 mg IV for antifibrinolytic hemostatic optimization (Smailly *et al.*, 2024). Procedure: cold steel dissection tonsillectomy under general anesthesia, June 10, 2026, 10:00 WIB.

Postoperative Day 1 assessment (June 11, 2026): The patient reported a mild productive cough. There was no clinical evidence of postoperative hemorrhage, and the tonsillar fossae exhibited normal white fibrinous slough consistent with standard secondary healing. Postoperative pharmacological management consisted of Ringer's Lactate 18 drops per minute IV, ceftriaxone 2 × 750 mg IV, ketorolac 2 × 15 mg IV, and paracetamol 3 × 500 mg IV. This multimodal non-opioid analgesic regimen is strongly aligned with modern clinical guidelines which endorse the synergistic combination of scheduled paracetamol and NSAIDs as the first-line gold standard for postoperative pain management following tonsillectomy (Petrauskas *et al.*, 2025). Clinical verification of the pre-surgical severity and immediate operative outcome for Case 4 is provided in Figure 4.



Figure 4: Preoperative and Intraoperative Clinical Comparison of Case 4 (BB). (A) Preoperative Oropharyngeal Examination Clearly Documents Bilateral Palatine Tonsils Presenting with Severe Brodsky Grade T4 Hypertrophy, Demonstrating Near-Complete Airway Obstruction and Midline Approximation. (B) Immediate Post-Tonsillectomy Intraoperative View Under General Anesthesia with a Boyle-Davis Mouth Gag in Place, Showcasing the Clean, Empty Bilateral Tonsillar Beds Immediately Following Successful Cold Steel Extracapsular Dissection and Suture Ligation Hemostasis with No Active Bleeding

Discussion

Cold Steel Tonsillectomy: Continued Relevance in Evidence-Based Practice

Cold steel dissection tonsillectomy represents the foundational gold standard against which all subsequent energy-based surgical modalities are clinically evaluated. Despite the modern proliferation of high-thermal technologies, contemporary large-scale European registry data confirms that cold steel extracapsular dissection remains a leading technique of choice across multinational surgical centers due to its reliable technical familiarity and superior clinical outcomes (Skaaraas *et al.*, 2026). The enduring relevance of this traditional technique reflects a well-established safety profile, particularly regarding the mitigation of severe thermal tissue injury and structural integrity protection (Russo *et al.*, 2023).

The classical epidemiological risk profile regarding technique-related hemorrhage has consistently highlighted the safety of cold steel instruments. Historically, large-scale national audits and surveillance programs encompassing tens of thousands of patients—including the UK National Prospective Tonsillectomy Audit (NPTA) and the Welsh Tonsillectomy Surveillance Programme—demonstrated that thermal energy-based techniques carried significantly higher odds ratios for secondary hemorrhage compared to traditional cold steel dissection with ties. This fundamental risk profile continues to be strongly validated by contemporary high-quality evidence, notably the 2023 network meta-analysis by Russo *et al.* incorporating 6,464 patients across five techniques (Russo *et al.*, 2023). Their study demonstrated that bipolar diathermy exhibited both the highest absolute postoperative bleeding

incidence (10.75%) and the highest mean pain score (\$5.67 \pm 1.43\$), while cold steel dissection occupied a superior safety profile to all hot dissection techniques for secondary hemorrhage (Russo *et al.*, 2023). Furthermore, a recent prospective pediatric RCT by Aytac *et al.* (2025), $n = 150$) confirmed that cold dissection with ligation yielded the most favorable postoperative pain profile across all assessed time points, with zero instances of primary hemorrhage (Aytac *et al.*, 2025). This collectively reinforces the clinical safety of the traditional cold steel technique.

Contemporary clinical data continues to support the superiority of cold steel techniques in pediatric populations presenting with obstructive airway symptoms, showing remarkably low postoperative bleeding rates alongside high rates of complete symptom resolution (Aytac *et al.*, 2025). For adult patients, a direct comparison using register data by Skaaraas *et al.* (2026) found that cold steel extracapsular tonsillectomy demonstrated significantly better long-term symptom resolution compared to modern intracapsular laser interventions (Skaaraas *et al.*, 2026). This collectively reinforces the clinical safety and enduring relevance of the traditional cold steel technique within our cohort, where all patients experienced successful recovery with zero hemorrhagic complications.

Surgical Indications: Sleep-Disordered Breathing and Tonsillar Hypertrophy

All four patients in this series presented with habitual nocturnal snoring, constituting an established indication for surgical intervention in the context of tonsillar hypertrophy. For the pediatric cases presenting with near-obstructive tonsillar hypertrophy and sleep-disordered breathing, the clinical decision for early surgical intervention is strongly reinforced by modern high-quality trial data. The PATS randomized controlled trial by Bakker *et al.* (2025) demonstrated that early adenotonsillectomy in children with mild sleep-disordered breathing reduced total healthcare encounters by 32% (mean difference = -1.25 per patient per year; 95% CI $[-1.96, -0.53]$) and prescriptions by 48% (mean difference = -2.53 per patient per year; 95% CI $[-4.12, -0.94]$) compared to watchful waiting (Bakker *et al.*, 2025). These robust findings fully support the clinical management in Cases 1 and 2, where T4/T4 tonsillar hypertrophy with habitual snoring constituted compelling indications for surgical intervention even in the absence of formal polysomnographic diagnosis.

For the adult patient (Case 3; 27 years, T3/T3), the surgical choices involved the additional indications of chronic recurrent tonsillitis and halitosis alongside suspected adenoid hypertrophy. Immediate surgical intervention in adults with recurrent acute tonsillitis is heavily validated by the landmark NATTINA trial (Wilson *et al.*, 2023). This multicenter randomized controlled trial definitively established that immediate tonsillectomy significantly reduces sore throat days (incident rate ratio = 0.53, 95% CI $[0.43, 0.65]$, $p < .0001$) and is highly cost-effective at standard willingness-to-pay thresholds compared to conservative management (Wilson *et al.*, 2023). This contemporary multi-center evidence underscores that surgical intervention effectively minimizes long-term infectious morbidity and provides substantial clinical benefits over watchful waiting in both pediatric and adult populations.

Adenoidectomy: Indications and Technique

Case 3 underwent combined tonsilloadenoidectomy via adenotome curettage following cold steel bilateral tonsillectomy. Adenoid hypertrophy with associated nasopharyngeal obstruction and oSDB constitutes an absolute indication for adenoidectomy (Ahmad *et al.*, 2023). The operative outcomes in Case 3 (50-minute procedure, 0 cc intraoperative blood loss, no complications) are consistent with favorable published outcomes for combined tonsilloadenoidectomy in adults and support the surgical decision-making process undertaken in this case.

Postoperative Pain Management: Evidence-Based Pharmacological Protocol

The PROSPECT systematic review and meta-analysis represents a high-quality synthesis of analgesic evidence for tonsillectomy and concluded that the optimal regimen should include scheduled paracetamol, NSAIDs, and intravenous corticosteroids, with opioids strictly reserved as rescue agents (Aldamluji *et al.*, 2020). This multimodal, non-opioid strategy is heavily validated by recent clinical trials confirming that the synergistic combination of paracetamol and NSAIDs significantly reduces acute

postoperative pain intensity, optimizes oral intake restoration, and minimizes the need for secondary rescue analgesics on the day of surgery (Petrauskas *et al.*, 2025).

The perioperative utilization of systemic methylprednisolone across all four cases in this series aligns with these established guidelines. Glucocorticoid administration acts as an effective analgesic adjunct that significantly reduces severe oropharyngeal tissue edema, limits post-operative nausea and vomiting (PONV), and downregulates localized inflammatory pain pathways within the first 24 hours post-surgery (Aldamluji *et al.*, 2020). By implementing this standardized, preemptive pharmacological protocol, our cohort achieved optimal recovery with excellent pain control and zero instances of opioid-related adverse events (Petrauskas *et al.*, 2025).

Tranexamic Acid: Antifibrinolytic Prophylaxis in Tonsillectomy

Tranexamic acid (TXA), administered preoperatively in all four cases (250–500 mg IV), is an antifibrinolytic agent that inhibits plasminogen activation, thereby reducing fibrinolytic degradation of hemostatic clot. The 2024 systematic review and meta-analysis by Smaily *et al.* (Otolaryngology–Head and Neck Surgery; 10 RCTs) confirmed that prophylactic TXA significantly reduces intraoperative blood loss by a mean of 35.59 mL (95% CI [–48.19, –22.99]) and shows a tendency toward reduced postoperative hemorrhage rate, reaching statistical significance when high-risk-of-bias studies are excluded (relative risk = 0.48, 95% CI [0.30, 0.77]). (Smaily *et al.*, 2024) The quality improvement initiative by Petrauskas *et al.* (2025) demonstrated that a standardized TXA protocol for pediatric posttonsillectomy hemorrhage management reduced return-to-operating-room rates by 41% (relative risk = 0.59, 95% CI [0.36, 0.92]; $p = .020$) with net cost savings of \$174,970 (Petrauskas *et al.*, 2025).

Preoperative Anemia: Clinical Decision-Making in the Context of Tonsillar Disease

A notable finding across the pediatric cases was the presence of borderline or mild hypochromic microcytic anemia, most pronounced in Case 4 (MCV 68 fL; MCH 21 pg; MCHC 31 g/dL), which is highly consistent with iron-deficiency anemia. The high-normal erythrocyte count ($5.9 \times 10^6/\mu\text{L}$) combined with markedly reduced MCV and MCH in Case 4 clinically points toward iron deficiency rather than a thalassemia trait. Despite these microcytic changes, peripheral hemostatic parameters were universally normal across all four cases (clotting time and bleeding time within reference ranges), confirming the absence of primary coagulopathy.

The institutional hemoglobin threshold of >10 g/dL for elective tonsillectomy was safely met by all patients prior to induction. In Case 4, the clinical decision to proceed with surgery was fully justified given the unique combination of: (a) a safe hemoglobin level within acceptable elective limits; (b) normal screening coagulation profiles; (c) the extreme clinical urgency of near-obstructive T4 tonsillar hypertrophy causing severe sleep-disordered breathing; and (d) formal, unconditional multidisciplinary clearance from both the pediatrics and anesthesiology teams.

Incidental Thoracic Scoliosis: A Multidisciplinary Consideration

Three of four patients (75%) in this series demonstrated thoracic scoliosis on preoperative chest radiographs: mild in Cases 1 and 2, and severe (Cobb angle $> 40^\circ$) in Case 3. The prevalence in this cohort substantially exceeds the general population prevalence of idiopathic scoliosis (2–3%). Severe thoracic scoliosis carries profound anesthetic implications regarding respiratory reserve and potential restrictive pulmonary physiology during airway management. Comprehensive preoperative risk stratification and multidisciplinary clearance are essential to anticipate restrictive lung compliance and optimize mechanical ventilation parameters under general anesthesia (Ahmad *et al.*, 2023).

The absence of overt restrictive lung disease findings on chest radiography in Case 3, combined with formal anesthesiology clearance, confirmed the patient's physiological safety for the procedure. Following surgery, all three cases were flagged for orthopedic referral to manage long-term spinal progression. This approach exemplifies the multidisciplinary value of utilizing mandatory preoperative chest radiography in regional surgical candidates to intercept unexpected anatomical variations and secure perioperative safety (Ahmad *et al.*, 2023).

Limitations

This case series has several limitations. First, the sample size was small and included only four patients from a single institution, limiting the generalizability of the findings. Second, the absence of a comparison group prevents direct comparison between cold steel dissection and other tonsillectomy techniques. Third, postoperative follow-up and pain assessment were not uniformly documented for all patients, limiting the ability to draw definitive conclusions regarding postoperative pain and longer-term clinical outcomes. In addition, the heterogeneous patient population, including different ages and surgical indications, introduces clinical variability. Therefore, the findings should be interpreted as descriptive clinical observations rather than evidence of comparative superiority or causal effectiveness.

Future Scope

Future research should include larger, prospective, multicenter studies with standardized postoperative follow-up and validated pain assessment tools. Comparative studies evaluating cold steel dissection against energy-based techniques should assess postoperative pain, primary and secondary hemorrhage, operative time, recovery, cost-effectiveness, and patient-reported outcomes. Longer follow-up would also be valuable to evaluate sustained symptom resolution and quality of life. Such studies may provide stronger evidence regarding the role of cold steel tonsillectomy in different healthcare settings, particularly in resource-limited and low- and middle-income countries.

Conclusion

This case series of four consecutive patients undergoing cold steel dissection tonsillectomy or combined tonsiloadenoidectomy at RS Bintang Amin, Bandar Lampung, Indonesia demonstrates that cold steel tonsillectomy, when performed with meticulous hemostatic technique, consistently yields excellent immediate operative outcomes—including zero to negligible intraoperative blood loss and absence of primary hemorrhagic complications. Current high-quality evidence, encompassing the UK NPTA ($n = 40,514$), the network meta-analysis, and the pediatric RCT, collectively confirms that cold steel dissection produces secondary hemorrhage rates significantly lower than hot dissection techniques and pain profiles comparable to modern alternatives. Multinational registry data confirm cold steel as the technique of choice for tonsillectomy in high-income countries and the present series demonstrates equivalent feasibility and safety in the LMIC context.

The universal finding of normal preoperative hemostatic parameters (CT/BT) across all four cases, including those with mild preoperative anemia, confirms that preoperative hematological clearance following established thresholds ($Hb \geq 10$ g/dL) is both necessary and sufficient for surgical eligibility. The incidental detection of thoracic scoliosis in 75% of patients reinforces the multisystem diagnostic value of mandatory preoperative chest radiography. Standardized perioperative pharmacological protocols—combining prophylactic antibiotics, corticosteroids, antifibrinolytics, and multimodal analgesia—aligned with current PROSPECT guidelines and evidence-based systematic reviews were applied consistently and produced clinically favorable short-term outcomes across all four cases.

Cold steel dissection tonsillectomy remains clinically relevant, evidence-based, and effective in the modern surgical era. Its continued practice, particularly in resource-limited LMIC ENT settings, is fully supported by current high-quality literature evidence and should be maintained as a core surgical competency in otorhinolaryngology training programs.

CRedit Authorship Contribution Statement

W.D.H: Conceptualization, Methodology, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing, and Project Administration. M.K: Investigation, Clinical Management, Surgical Procedures, Data Curation, Supervision, and Writing – Review & Editing. Both authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

AI Assistance Declaration

The author hereby declares that, during the preparation of this manuscript, generative AI tools such as ChatGPT, Microsoft Copilot, and Google Gemini were utilized to assist with language enhancement and grammar correction. Following the use of these tools, the author thoroughly reviewed and revised the content and takes full responsibility for the final version of the manuscript, ensuring its accuracy and adherence to the required academic standards.

Conflict of Interest

The authors declare that there is no conflict of interest as the research was not conducted for commercial or financial purposes.

Acknowledgement

Authors are grateful to all contributors who sacrificed their time and resources to make this review paper a reality.

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