



## Case report

# The application of honey in wound care of raw surface at spontaneous rupture submandibular abscess that extends to submental and right neck: A case report

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## ABSTRACT

**Introduction:** Honey has been reported to accelerate wound healing. The use of honey in wound care mostly uses medicated (Manuka) honey. There are still few who report using Nusantara honey, local honey from Indonesia, as a wound dressing. We report wound care using Nusantara honey in patients with a remarkably open wound due to a ruptured submandibular abscess extending to the submental and right neck.

**Presentation of case:** A 67 years old male patient came with a ruptured submandibular abscess that extends to the submental and right neck. On the right submandibular region, an ulcer extends to submental with a size of  $10 \times 4 \times 3$  cm, hyperemic, edema around the wound, fluctuating, with pus and tenderness. The isolated bacteria were *Staphylococcus aureus*. The patient received combination antibiotic therapy, blood sugar management, necrotomy debridement, tooth extraction, and wound care using Nusantara honey on the sixth day after surgery. An improvement was seen on the 10th day after necrotomy.

**Discussion:** The use of honey for wound care is based on thousands of years of history. Honey can accelerate wound healing and show different effects depending on the phase of wound healing. In addition, honey also has antibacterial properties.

**Conclusion:** Applying Nusantara honey to treat raw surfaces can help speed up wound healing and provide cost-efficiency. There were no allergic reactions or secondary bacterial infections after using honey in this patient.

## 1. Introduction

A submandibular abscess caused by aerobes and anaerobes bacteria is one of the deep neck infections where pus formation occurs in the potential space between deep neck fascia [1–3]. The clinical symptoms are fever, pain on the neck, accompanied by swelling below the mandible or below the tongue with or without fluctuation, trismus, and erythema [1,2].

The management consists of airway management, treating the source of infection, adequate antibiotic therapy, and surgical procedures (incision and drainage or necrotomy debridement). The complications of this abscess are respiratory problems and other severe clinical sequelae. Thus proper wound healing is required [1–4].

Honey contains protease enzymes that can induce scar tissues for rapid autolytic debridement, stimulate granulation and epithelization, and provide a moist environment that can help minimize scar tissue formation. A prior study by Ayu Diah K.P. et al. compares the antibacterial effect of local Indonesian honey and Manuka honey against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and MRSA [5–7].

We aimed to report the use of honey in the treatment of open wounds resulting from spontaneous rupture of a submandibular abscess extending to the submental and right neck. This study confirms that honey can have benefits in wound care. The honey commonly used in wound care is Manuka, but we use Nusantara honey, local honey, from Indonesia.

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(SCARE) criteria [8].

## 2. Case presentation

A 67 years old male patient came to Dr. Hasan Sadikin Center General Hospital with swelling in the right lower jaw two weeks before admission and released pus three days before admission. The complaint was also accompanied by pain in the right jaw and trismus; no other complaint was reported. The patient has uncontrolled diabetes mellitus.

The general condition was stable, and no other abnormalities. On the right submandibular region, an ulcer extends to submental with a size of 10 × 4 × 3 cm, hyperemic, edema around the wound, fluctuating, with pus and tenderness. The patient had a trismus with an interdental opening of 1 finger (Fig. 1).

Neck soft tissue x-ray demonstrated opaque density appearance in the right submandibular, suggestive for right submandibular mass (Fig. 2).

The laboratory findings were leukocytosis (leukocyte 23950 cells/mm<sup>3</sup>), hyperglycemia (random blood glucose 448 mg/dl), and reactive HbsAg chromatography. Regarding the appearance of the lesion, we consider scrofuloderma as a differential diagnosis; the patient was tested for tuberculosis using a rapid molecular test, and the result was negative.

The patient gets an infusion of NaCl 0.9% 1500 cm<sup>3</sup>/24 h, ceftriaxone 1 × 2 g, metronidazole 3 × 500 mg given empirically, ketorolac 2 × 30 mg, and 0.5 units/h of insulin drip with titration dose. The patient underwent wound care two times a day and was covered with moist gauze.

The patient was consulted to the Internal Medicine Department to manage diabetes mellitus and the Oral and Maxillofacial Surgery Department. It was found that chronic apical periodontitis was caused by gangrene of the roots of teeth 18, 17, 23, 24, and chronic apical periodontitis was caused by pulp gangrene of teeth 45, 99, which were the source of infection in this patient. The patient underwent panoramic x-ray with the results of the remaining root teeth 17, 18, 23, 24; dental cavity 44; multiple missing dental; there was no lucent lesion around the tooth root. The patient underwent tooth extraction 18, 17, 23, 24, 43 by Oral Maxillofacial Surgeon with local anesthesia at the outpatient clinic (Fig. 3).

On the third day of treatment, an otolaryngologist performed necrotomy debridement. The tissue sample was obtained for histopathological examination, and the result was a nonspecific abscess at the submandibular region. The isolated bacteria were *Staphylococcus aureus* and are sensitive to ampicillin-sulbactam, cefoxitin, ceftriaxone, gentamycin, amoxicillin-clavulanate, piperacillin-tazobactam, cephalothin, cefazoline, cefuroxime, cefoperazone, cefotaxime, ceftazidime, cefepime, and ciprofloxacin antibiotics. The patient received ceftriaxone and metronidazole antibiotics for 14 days (Fig. 4).

The open wound began to form granulation tissue on the sixth day after necrotomy debridement. Pure honey, “Madu Nusantara,” was

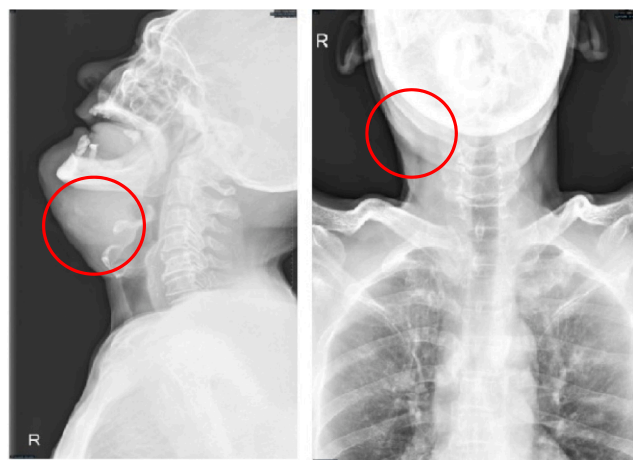


Fig. 2. Neck soft tissue x-ray.



Fig. 3. Panoramic x-ray.



Fig. 4. Left: day 0 post necrotomy debridement, right: day 10 post necrotomy debridement.



Fig. 1. Clinical photo before operation.

started to be given as a dressing for wound care. On the tenth day after necrotomy debridement, the open wound was getting better, more minor, with no pus nor slough, and the granulation tissue has increased. The patient also feels much better. Then, the patient was planned for

defect closure by the Facial Plastic Reconstruction Division of the Otorhinolaryngology-Head and Neck Surgery Department (Table 1).

### 3. Discussion

Deep neck space infection (DNSI) is an infection in the neck's potential spaces and fascial planes, either with abscess formation or cellulitis [9]. In this case, the manifestation of DNSI was in the form of a submandibular abscess. Common etiology was an odontogenic infection [10,11,12]. Patients with diabetes, and immunosuppression, are more susceptible to DNIs [10,11,13]. In this case, the patient had uncontrolled DM, and thus susceptible to infection because DM weakened the immune system. This case developed from a long-delay in the wound healing process [14–17].

A submandibular abscess can occur at any age, but the least incidence is at the age of >60 years, and more common (about 53%) in men [15,17]. Dental or odontogenic infections are the most common cause of submandibular abscesses. Thus, in this case, the elimination of dental infection was needed and done by the oral surgery department [18].

In this patient, we found *Staphylococcus aureus*, gram-positive, facultative anaerobic bacteria. This result is in line with a study by Hossein et al., which found that in a culture, as much as 46% was aerobic bacteria, 33% was anaerobic bacteria, and 21% was a combination of aerobic and anaerobic bacteria, including *Streptococcus viridans*, *Staphylococcus aureus*, and *Klebsiella pneumonia* (primarily found in DM patient) [17,18].

Empirically, a combination of ceftriaxone and metronidazole was given to these patients. The administration was continued until 14 days since the culture results showed that the bacteria are sensitive to ceftriaxone and metronidazole [17,19,20].

The wound care for this patient was to clean the wound with 0.9% NaCl and cover it with moist gauze. Debridement necrotomy was done on the fourth day in the operating room. On the sixth day post-surgery, there was no pus and slough, granulation tissue was visible, and Madu Nusantara treatment was started. Honey exerts its effect on wound healing through its antimicrobial properties and changes in physiological and immunological functions. The most characteristic role of honey in wound healing is the prevention and restriction of bacterial infection, thereby reducing the biological burden on the wound. Honey has been shown to change the size and shape of bacterial cells [21].

Ayu et al. concluded that Manuka honey has MIC lower than local Indonesian honey (madu Lokal Nusantara) [6]. Lokal Nusantara honey has antibacterial activity against *P. aeruginosa*, MRSA, and *S. aureus*. Studies show that honey can alter cytokine release. Honey has been shown to release tumor necrosis factor-alpha (TNF- $\alpha$ ) from monocytic cell lines. Other studies suggest that honey can stimulate the production of inflammatory cytokines in mild inflammation and suppress the same cytokines in infection, including TNF- $\alpha$  and interleukin- $\beta$ . Wound healing consists of coagulation and hemostasis, inflammation, proliferation, and wound remodeling or maturation. Honey has been shown to contribute to several wound healing phases, thereby altering the physiology of wound healing. In this case, we use local honey "Madu Nusantara" because it is cheaper, easier to obtain, and the wound healing effect is the same as Manuka honey [5–7].

*Clostridium botulinum* spores are found in more than 26% of raw honey. Thus, sterilization is required to prevent botulism [22]. Medical use honey (Manuka honey) was usually sterilized by gamma irradiation at dosages of 25–50 kGy. No botulism cases have been reported as a complication [22,23]. In this case, the honey was also sterilized.

Honey's bioactive components were found to reduce inflammation, edema, and pain, have a debridement effect and speed up granulation and epithelization. Honey also has better cosmetic results than other therapies in terms of wound healing outcomes, reduces the length of time spent in the hospital for chronic wounds, and is cost-effective [23].

**Table 1**

Wound evaluation.

Day	Size	Pus	Slough	Granulation tissue
D-day surgery	10 × 8 × 3	30 cm <sup>3</sup>	++	–
Post surgery				
4th day	10 × 8 × 3	5 cm <sup>3</sup>	Minimal	Minimal
6th day	10 × 8 × 2	Minimal	Minimal	Slightly appear
10th day	9 × 7 × 1	No	No	Increasing

### 4. Conclusion

Applying Nusantara honey to treat raw surfaces can help speed up wound healing and provide cost-efficiency. There were no allergic reactions or secondary bacterial infections after using honey in this patient.

### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

### Provenance and peer review

Not commissioned, externally peer-reviewed.

### Ethical approval

This study has received ethical approval at our institution.

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### Guarantor

R. Ayu Hardianti Saputri, ORLHNS specialist at Padjadjaran University/Dr. Hasan Sadikin General Hospital, Bandung.

### Research registration number

Not applicable.

### CRediT authorship contribution statement

Study conception and design: R. Ayu Hardianti Saputri, Shinta Fitri Boesoire, Gracia Cintia Massie. Acquisition of data: R. Ayu Hardianti Saputri, Shinta Fitri Boesoire, Gracia Cintia Massie. Analysis and/or interpretation of data: R. Ayu Hardianti Saputri, Shinta Fitri Boesoire, Gracia Cintia Massie. Drafting the manuscript: R. Ayu Hardianti Saputri, Shinta Fitri Boesoire, Gracia Cintia Massie, Vesara Ardhe Gatera. Revising the manuscript critically for important intellectual content: R. Ayu Hardianti Saputri, Shinta Fitri Boesoire. Approval of the version of the manuscript to be published: R. Ayu Hardianti Saputri, Shinta Fitri Boesoire, Gracia Cintia Massie.

### Declaration of competing interest

The authors declare that there is no conflict of interest.

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