

Case Report

A study of wound healing process in post total laryngectomy patients: Serial case reports

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Abstract

Laryngeal carcinoma is a malignancy on larynx that may occur in glottic, supraglottic and subglottic. Larynx plays role in coordination of upper aerodigestive tract such as breathing, verbal and swallowing. This reported as the third most common malignancy in the ENT-HN department. Total laryngectomy is a procedure that performed on T3 and T4 lesions. The most common complication is prolonged of the wound healing process. The process is very complex consist of four overlapping phases that involve multifactorial divided into local and systemic factors. Local factors include oxygenation and infection, while systemic factors are age, gender, psychological stress, nutrition, chronic disease and immunocompromise conditions. In this case, seven patients underwent total laryngectomy and contributing factors of wound healing process were observed in each patient until 14th postoperative day. Some of important factors might contributed to the wound healing process in some patients such as psychological stress, nutrition and chronic disease such as diabetes mellitus and hypertension.

Keywords: Total laryngectomy, wound healing, age, stress, nutrition, chronic disease.

Introduction

laryngeal carcinoma is a malignancy on larynx that may occur in glottic, supraglottic and subglottic. Larynx plays important role in coordination of upper aerodigestive tract such as breathing, verbal and swallowing. This reported as the third most common malignancy in the ENT-HN department, especially in men over 40 years. Smokers and alcoholics are the highest risk group¹. Total laryngectomy is a procedure performed on T3 and T4 lesions, that removes all of the laryngeal structure at the upper border of the epiglottis and hyoid bone to the lower border of the tracheal ring (Indiyana and Kentjono, 2016; Schunke et al., 2016; Vashishta, 2015).

Laryngectomy may related to some complications such as pharyngocutaneous fistula, tracheoesophageal fistula, stenosis stoma and most commonly is secondary wound infection that leads to prolonged proliferative phase and delayed oral feeding. It might impact the quality of life, morbidity and length of stay in the hospital (Indiyana and Kentjono, 2016; Vashishta, 2015).

Wound healing process in post total laryngectomy is very complex consist of four overlapping phases that include haemostasis phase, inflammation phase, proliferative phase and remodelling phase (Ballenger and Snow, 2003; Reksodiputro and Harahap, 2021; Sudjtmiko, 2014; Wallace et al., 2017). It involves multifactorial factors including local and systemic factors. Local factors include oxygenation and infection, while systemic factors are age, gender, psychological stress, nutrition, chronic disease and immunocompromise conditions (KODI Plastik Rekonstruksi, 2015; Pastar et al., 2014; Qureshi et al., 2005; Shah et al., 2019; Sudjtmiko, 2014).

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In this case report we reported serial case patients with total laryngectomy. All patients had same instruction post total laryngectomy performed such as head up 30-45°, high calories and protein dietary via NGT, forbid to swallow saliva and oral feeding until the wound heals, antibiotics and analgesics were provided as indicated. The wound healing phase was observed until 14th days post-operative and the factors that prevent are discussed.

Serial Cases

Case 1

A 50-year-old male patient from with T4aN2Mo IV stage laryngeal carcinoma and already had total laryngectomy on March 16 2021, with a chief complaint of dyspnoea since two weeks ago and history of hoarseness in the last six months. Patient had hypertension and treated with amlodipine 5 mg regularly. The patient was an active smoker as much as two packs per day since he was 15 years-old.

The third day post-surgery the wound looked dry, no signs of bleeding, the drain and tracheal cannula was removed and followed by open wound dressing with gentamicin topical ointment (Figure 1). Patient has a family who always support and take care him. On 7th post-operative day (POD), the patient was discharge and scheduled for wound care in the ENT polyclinic regularly. On the 11th POD, the patient took an oral drinking test in front of the doctor, after it was confirmed that there was no leakage, the nasogastric tube (NGT) was removed and the patient was allowed to take oral feeding gradually.



Figure 1. Serial follow-ups of the wound healing processes between the 3rd and 11th post-operative day (POD) of Case 1 patient.

Case 2

A 53-year-old male was referred with a chief complaint dysphagia in the last three months, the patient was put on a nasogastric tube three month before total laryngectomy and neck dissection was performed. The patient has a T4aN1Mo IV stage laryngeal carcinoma. The patient was an active smoker since 40 years ago.

On the 3rd POD, the wound around the stoma look hyperaemic, and drain production about 35 cc that still maintained (Figure 2). On the 5th POD, there was a fistula in the stoma and the drain production looked serous mixed pus as much as 35 cc and was removed on 9th day. Laboratory results showed indicated a low haemoglobin (9.5 mg/dL) and albumin level (2.88 g/dL) while other parameters were with normal

limits. On 12th POD the fistula look smaller than before. Patient went home with NGT still maintained, followed by wound care at the ENT Polyclinic every day.



Figure 2. Serial follow-ups of the wound healing processes between the 3rd and 35th post-operative day (POD) of Case 2 patient.

The patient routinely performed wound care at the ENT polyclinic until 35th day, the wound looks completely dry (Figure 2). The patient took an oral drinking test in front of the doctor after and the NGT was removed and the patient was allowed to take oral feeding gradually.

Case 3

A 54-year-old male patient with a chief complaint of hoarseness in the last two years, that was followed by dysphagia. The patient had sleep and anxious problem and should take alprazolam since 12 years ago continuously. The patient had uncontrolled hypertension and is an active smoker and alcoholic drinker. The patient also had inharmonious relationship with the family. The patient was diagnosed T4aN2Mo IV stage laryngeal carcinoma.

On the 1st DPO, the patient drank bottled soft drink, water and coffee via oral secretly. On the 2nd DPO, the right and left cheek was slightly swollen. The wound was wet, serous mixed blood came out between sutures. On the 3rd DPO, the cheek was more swollen and the pus came out from between of the sutures. A debridement and bleeding exploration was conducted on the patient. On the 5th POD after re-open debridement and bleeding exploration surgery, the greenish yellow coloured fluid with odor came out from the wound and stoma continuously (Figure 3). The thorax x-ray found a bilateral pneumonia.

Laboratory finding showed decrease haemoglobin (9.5 mg/dL) and with leucocyte level was 27.400mm³. The prothrombin time (PT) was 20 second and partial thromboplastin time (aPTT) was 40 second. The patient on sepsis condition and patient passed away with final diagnosis pneumonia and acute respiratory distress syndrome on sepsis.



Figure 3. Serial follow-ups of the wound healing processes between the 3rd and 5th post-debridement of Case 3 patient.

Case 4

A 70-year-old male patient was referred to emergency room with a chief complaint of dyspnoea in the last four days before admission. Hoarseness complained since two years ago. The patient had controlled hypertension with amlodipine routinely for more ten years. Diabetes mellitus (DM) type 2 was diagnosed one month before admission and history of stroke 5 years ago.

Patient was diagnosed with laryngeal carcinoma T4aN1M0 and total laryngectomy was performed. On 3rd POD, the wound looks dry except at the stoma with drainage production 45cc. On the 14th POD, the wound was completely dry. The patient did the drinking test, after it was confirmed that was no leakage. The NGT was removed and the patient was allowed to take oral feeding gradually.



Figure 4. Serial follow-ups of the wound healing processes between the 5th and 14th post-operative day (POD) of Case 4 patient.

Case 5

A 64-year-old male patient from Aceh was referred to Dr Zainoel Abidin General Hospital with a chief complaint of hard to breath since three weeks before the admission and it became continuous since one and more severe during activities. Hoarseness was reported since two years ago and the patient was an active smoker

for more than 20 years. After the total laryngectomy, the patient had a good condition and hematologic parameters in normal limits. On the 3rd POD day the drain production less than 5 cc and the was discarded on 7th after surgery (Figure 5).

On the 14th POD, the patient took an oral drinking test after it was confirmed that there was no leakage (Figure 5). The NGT was removed and the patient was allowed to take oral feeding gradually.



Figure 5. Serial follow-ups of the wound healing processes between the 3rd and 14th post-operative day (POD) of Case 5 patient.

Case 6

A 66-year-old male patient from Aceh was referred to Dr Zainoel Abidin General Hospital with a chief complaint of breathless in the one month before the admission. A total laryngectomy was conducted to the patient. Vital sign and laboratory result in normal limits.

On the 3rd POD the wound was dry with no other problems and 5 cc was produced from the drain (Figure 6). Seventh day post procedure, the patient had cough, febrile and weak condition. The PCR for coronavirus disease 2019 (COVID-19) yielded a negative but the symptoms persisted. A repeated PCR three days later resulted positive and the chest X-ray indicated a pneumonia. The patient was transferred to Respiratory Intensive Care Unit and expired on 12th post-surgery.



Figure 6. Serial follow-ups of the wound healing processes between the 3rd and 11th post-operative day (POD) of Case 6 patient.

Case 7

A 54 year old male patient from was referred to Dr Zainoel Abidin General Hospital with a chief complaint is dyspnoea since a week and felt heavy about two days ago. Hoarseness and dysphagia have been also felt early two month before the admission.

The patient was diagnosed with laryngeal carcinoma T3N3M0 and total laryngectomy was performed. On the 3rd POD the wound was hyperaemic and drain produced 45 cc (Figure 7). The patient was anaemia and hypoalbuminemia and were treated until back to normal. On the 7th POD the drain was removed and patient was discharged on the 10th POD. The patient went to the ENT Polyclinic routinely. On the 32nd POD feeding oral has not started because there was still tracheocutaneous fistula in the stoma (Figure 7).



Figure 7. Serial follow-ups of the wound healing processes between the 3rd and 11th post-operative day (POD) of Case 7 patient.

Discussion

The wound healing is very complex process that is overlapping each phase and multiple factor are involved including local factors such as oxygenation and infection and systemic factors such as age, gender, psychological stress, nutrition, chronic disease and immunocompromise conditions (Pastar et al., 2014; Wallace et al., 2017). A study found that the incidence of chronic wounds was double in the group over 50 years old because they have a thinner epidermis and inflammatory low response (Pastar et al., 2014). In our case series, patients who had the fastest wound healing process was the patient as 50 years old followed by a patient aged 70 and 60 years old.

Physiological stress has greatly impact on healing process and it could reduce the expression of the chemoattractant cytokines which are important for inflammatory phase of the wound healing process. Glucocorticoid hormones suppress differentiation and proliferation of the cells and reducing the expression of cell adhesion molecules in wounds (Guo and DiPietro, 2010; Maquart and Monboisse, 2014; Wallace et al., 2017). This was very relevant with the third case who had a bad social relationship.

The chronic diseases such as hypertension and DM are factors that prevent wound healing process. Impaired insulin production in diabetes mellitus cause blood glucose level imbalance and could cause less effective leukocytes in controlling the infection. In addition it also induces microangiopathy leading to tissue hypoxia that cause delayed healing process (Guo and DiPietro, 2010; Shah et al., 2019). In our case series there patients had hypertension while one patient had DM. These chronic diseases could also contribute to the delayed of the healing processes in these patient.

Nutrition is the most important for wound healing process. Its consist of macronutrients and micronutrients. Macronutrients include proteins and amino acids, carbohydrates and lipids, the micronutrients are vitamin and mineral (Dhingra et al., 2018; Dryden et al., 2013). Protein is a primary component to support cell generation, tissue growth, collagen formation, epidermal growth and keratinization. Albumin is molecule of protein in erythrocytes that combines with oxygen and carbon dioxide to help metabolize and transport nutrients to tissues, maintain microvascular integrity so that can prevent port de entry of microorganisms into the blood vessels. If albumin level was decrease this could disturb the nutrients transporting process to the tissues (Dryden et al., 2013; Guo and DiPietro, 2010). From this case series, the second and seventh patients had dysphagia history before total laryngectomy and this might cause prolonged malnutrition that contributed to the prolonged wound healing process in those patients.

Conclusion

We reported seven patients with total laryngectomy and the wound healing process were observed closely. Our cases had a great variation of time length required for total wound healing; depending the severity of disease as well as the internal and external factors. A study using bigger sample size and more homogenous patients is required to further assess the determinants associated with healing process in total laryngectomy.

Authors' contributions

Conceptualization: SW and IZ; Data Curation: IZ and BK; Formal Analysis: SW, IZ, and BK; Investigation: SW; Methodology: IZ, and BK; Project Administration: SW,

LS, FF and SS; Supervision: IZ and BK; Validation: IZ, BK, LS, FF and SS; Writing – Original Draft Preparation: SW; Writing – Review & Editing: SW, IZ and BK.

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Conflict of interest

There are no competing interests that exist.

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