Case report

Surgical correction of a percutaneous dilatational tracheostomy: A case report

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ARTICLE INFO

Keywords:
Percutaneous dilatation tracheostomy
Surgical tracheostomy
Tracheostomy complication
Tracheal defect
Tracheal cannula
Goiter

ABSTRACT

Introduction and importance: Percutaneous dilatational tracheostomy (PDT) has become a routine procedure in intensive care, because of its multiple advantages over surgical tracheostomy (ST).

Case presentation: We present the case of a 72-year-old patient with SARS-CoV-2 pneumonia, who received a PDT in the 6th tracheal ring with a lateral puncture of the trachea. This atypical placement of tracheostomy was due to a massive left-pronounced goiter, causing a tracheal shift to the right. To avoid dislocation of the tracheal cannula and prevent recurrent bleeding, surgical revision was decided. After left hemithyroidectomy, oral intubation was temporarily necessary, in order to remove the old tracheostomy. Then suturing of the left lateral tracheal defect and standard ST in the 2nd tracheal cartilage was performed. The patient was successfully weaned and decannulated and his swallowing function remained intact.

Clinical discussion: In our case left hemithyroidectomy was necessary, in order to enable an optimal surgical tracheostomy in the 2nd tracheal cartilage. Because mechanical ventilation was carried out proximal to the large tracheal defect after PCT, a secondary closing approach was not an option. The endotracheal cuff was placed above the defect, in order to prevent acute or chronic intraluminal pressure trauma. Postoperative x-ray and bronchoscopy insured the sufficient sealing of the tracheal suturing.

Conclusion: We describe an unusual placement of percutaneous dilatational tracheostomy through a thyroid goiter and our approach to perform a correction surgical tracheostomy.

1. Introduction

Several studies have shown so far that early tracheostomy reduces the length of stay in the intensive care unit (ICU) and the duration of mechanical ventilation [1]. Percutaneous dilatational tracheostomy (PDT) has become a routine procedure in intensive care, because of its multiple advantages over surgical tracheostomy (ST) [2]. Careful patient selection and use of preoperative ultrasound and/or perioperative bronchoscopic guidance decrease the procedure failure rate and the peri-interventional complications [3]. However, ST remains the primary option in case of massive goiter, obesity, pneumomediastinum, difficult cervical anatomy, high bleeding risk due to coagulopathy, hemodynamic and/or respiratory instability [4]. We are presenting a case of an unusual placement of a PDT and discuss our surgical therapeutic approach. Written informed consent was obtained from the patient to publish this case report, including any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. This report fulfills the current SCARE 2020 criteria [5].

2. Presentation of case

A 72-year-old male patient was initially admitted to a peripheral hospital after being diagnosed with respiratory insufficiency, due to a severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) pneumonia. According to his medical record, he suffered from diabetes...
mellitus Type 2 and he was a kidney transplant recipient on chronic immunosuppression. Due to respiratory deterioration, invasive ventilation had to be initiated. The effectiveness of analgosedation regime was insufficient, so that an early bronchoscopy-guided PDT was performed the day after his intubation, in order to enable spontaneous breathing as soon as possible. Four days later, further respiratory deterioration occurred and diffuse bleeding in the tracheostomy-site was observed, which ceased spontaneously. The patient was transferred to our university hospital for further evaluation, as invasive ventilation was no longer lung-protective and circulatory instability occurred, as a result of respiratory acidosis.

We performed a cervical and thorax computed tomography (CT)-scan, which revealed bilateral ground glass opacity of the lung and a massive, inhomogeneous goiter of the left thyroid lobe with irregular hypodense thyroid nodules with a maximum size of 9 × 4.9 cm, causing a tracheal shift to the right (Figs. 1, 2). The tracheostomy tube was inserted through the goiter node (Figs. 3, 4).

A few days later, the patient was responding to the treatment. We implemented adjusted ventilation parameters, sedation was reduced and the patient was awake. No bleeding recurrence was observed during his treatment in our department. However, the patient’s mobilization was risky, due to the misplacement of tracheostomy. In order to avoid difficulties by re-insertion of the tracheal cannula in case of dislocation and minimize the risk of recurrent bleeding, especially during mobilization, we decided for a surgical modification of the tracheostomy, after interdisciplinary discussion and written informed consent of the patient’s legal guardian.

Intraoperatively, there was an enlarged left thyroid gland with the tracheal cannula inserted in the 6th tracheal cartilage laterally (Fig. 5). After performing a left hemithyroidectomy, oral intubation was temporarily necessary, in order to remove the old tracheostomy. Then closing of the left lateral tracheal defect with polydioxanone interrupted suture (PDS) 3/0 and standard ST in the 2nd tracheal cartilage was performed. The endotracheal cuff was located above the tracheal defect, which functioned as a protective factor against acute or chronic intraluminal pressure trauma. Postoperative x-ray excluded pneumothorax or pneumomediastinum, as an evidence of missing air leak, and a regular bronchoscopy insured the sufficient sealing of the tracheal defect.

Respiratory weaning was conducted according to the protocol of our ICU in a daily modus of controlled ventilation alternating with spontaneous breathing. The patient could be successfully weaned and decannulated and his swallowing function remained intact.

3. Discussion

We report a unique case of PDT in the 6th tracheal ring with a lateral...
puncture of the trachea. To our knowledge, this is the first report of such an unusual placement of percutaneous tracheostomy. The reason for primary choosing dilatational over surgical tracheostomy, despite the anatomical challenges of the case, was probably the availability of this procedure in the ICU setting of our colleagues. The atypical placement was not otherwise possible, because of the right tracheal shift due to the massive left-pronounced goiter.

Duaan et al. reported a case of thyroid isthmus puncture during PDT without complications [6]. However, severe well-known complications after tracheostomy are decannulation, obstruction and hemorrhage and less severe but common are tracheoesophageal or tracheocutaneous fistula formation, tracheal stenosis and infection [7]. In our case, the risk of dislocation during mobilization was high and the tracheal tube reinsertion could become difficult, as former hemorrhage occurred. For that reason, surgical correction of tracheostomy was decided. After left hemithyroidectomy, percutaneous tracheostomy was sutured and ST was performed in the 2nd tracheal cartilage. We decided for a left hemithyroidectomy, former to the ST, in order to enable an optimal tracheostomy placement in the 2nd tracheal cartilage.

Beiderlinden et al. presented 3 cases of tracheal injuries during PDT, with tracheal tears ranging between 2 and 5 cm, which was successfully treated conservatively [8]. This was enabled by placing the cuff blocking distal to the tracheal defect, in order to avoid air leakage during mechanical ventilation. Nevertheless, surgical approach is recommended in cases where mechanical ventilation cannot be delivered distal to the tracheal laceration [9]. In our case, mechanical ventilation was carried out proximal to the large tracheal defect after PDT, because of its depth and proximity to carina. A secondary closing approach was, therefore, not an option. The blocking cuff of the new tracheal cannula was placed above the defect, in order to prevent acute or chronic intraluminal pressure trauma. Postoperative x-ray excluded pneumothorax or pneumomedistinum, as an evidence of missing air leak, and a regular bronchoscopy insured the sufficiency of the sutured tracheal defect.

4. Conclusion

We describe an unusual placement of percutaneous dilatational tracheostomy through a thyroid goiter and our approach to perform a correction surgical tracheostomy. Further investigation is necessary to evaluate if an unusual PDT placement should be surgically corrected or not.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

Ethical approval was not required for this study in accordance with local/national guidelines.

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.

References

[1] J. Griffiths, V.S. Barber, L. Morgan, J.D. Young, Systematic review and meta-analysis of studies of the timing of tracheostomy in adult patients undergoing artificial ventilation, BMJ 330 (7502) (2005) 1243.
[2] H.J. Baumann, C. Kemei, S. Kluge, Die tracheotomie auf der intensivstation (Tracheostomy in the intensive care unit), Pneumologie 64 (12) (2010) 799–776.
[3] C. Mehta, Y. Mehla, Percutaneous tracheostomy, Ann. Card. Anaesth. 20 (Supplement) (2017) S19–S25.
[4] M. Basili, F. Tubo, C. Poggi, D. Diso, M. Anile, T. De Giacomo, Y. Pecoraro, C. Carillo, F. Pugliese, F. Venuta, J. Vannucci, Is surgical tracheostomy better than percutaneous tracheostomy in COVID-19-positive patients? Anesth. Analg. 131 (4) (2020) 1000–1005.
[5] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical Case Report (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.
[6] C.W. Duan, M.S. Hsieh, P.T. Chen, H.P. Chou, C.S. Huang, Successful percutaneous tracheostomy via puncture through the thyroid isthmus, Respirol. Case Rep. 2 (2) (2014) 57–60.
[7] L.J. Bonfetto, S.L. Manning, Tracheostomy emergencies, Emerg. Med. Clin. North Am. 37 (1) (2019) 109–119.
[8] M. Beiderlinden, M. Adamzik, J. Peters, Conservative treatment of tracheal injuries, Anesth. Analg. 100 (1) (2005) 210–214.
[9] T. Schneider, K. Storz, H. Dierensmann, H. Hoffmann, Management of iatrogenic tracheobronchial injuries: a retrospective analysis of 29 cases, Ann. Thorac. Surg. 83 (6) (2007) 1960–1964.