

喉頭気管ハンズオン

卒前卒後教育委員会

日本大学医学部耳鼻咽喉・頭頸部外科学分野

中村一博

2024/05/17 第125回日本耳鼻咽喉科頭頸部外科学会総会 大阪

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研修医と学生のみなさまへ

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日本気管食道科学会・編

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外科的気道確保マニュアル 第2版

日本気管食道科学会ホームページより閲覧・ダウンロード可能

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外科的気道確保 マニュアル 第2版



日本気管食道科学会 編

日本気管食道科学会

東京慈恵会医科大学 大村和弘



講師陣

n University School of Med

香川大学 福村崇



日本大学 吉田まりん



高知大学 長尾明日香

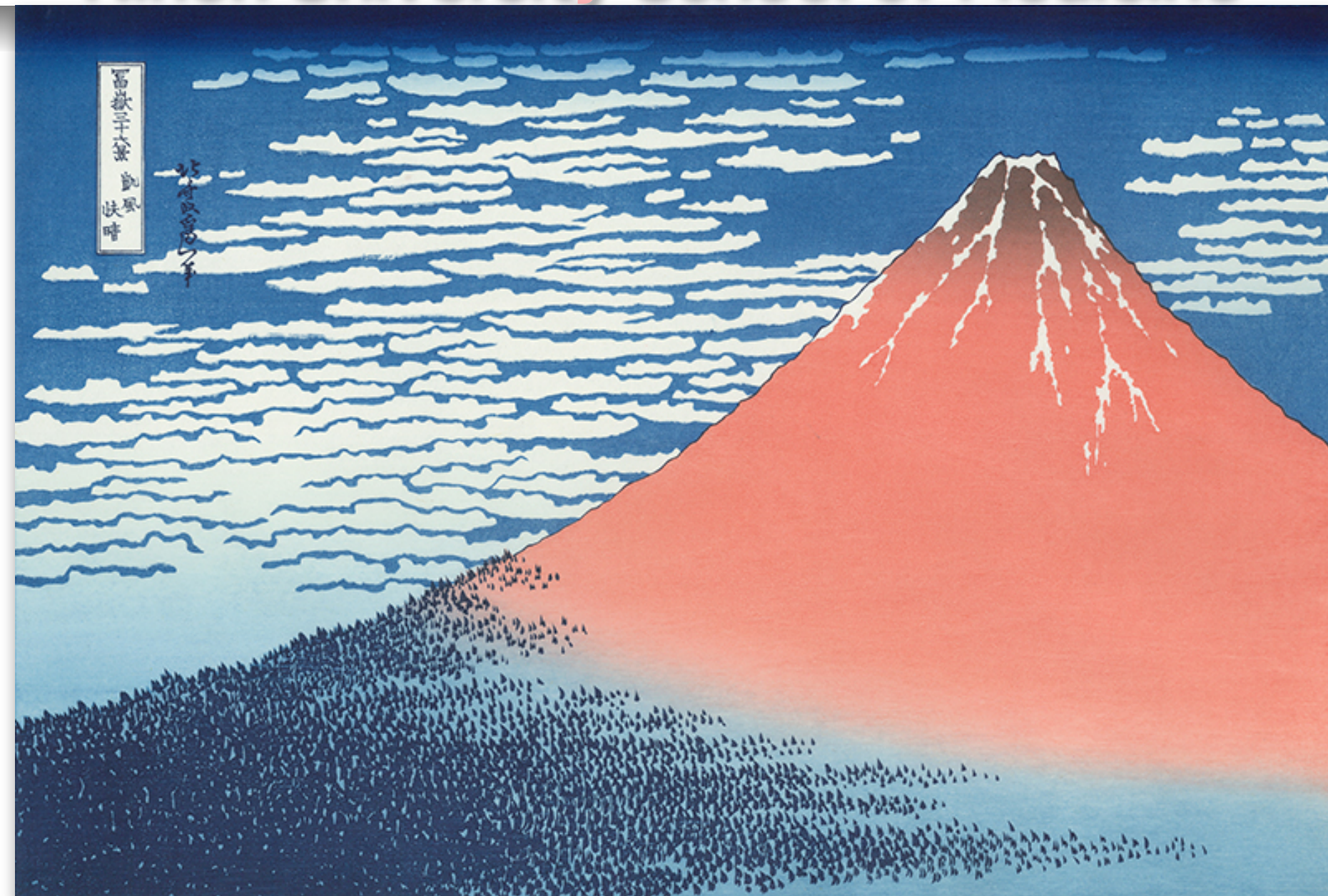


愛知医科大学 中村宏舞



気道確保

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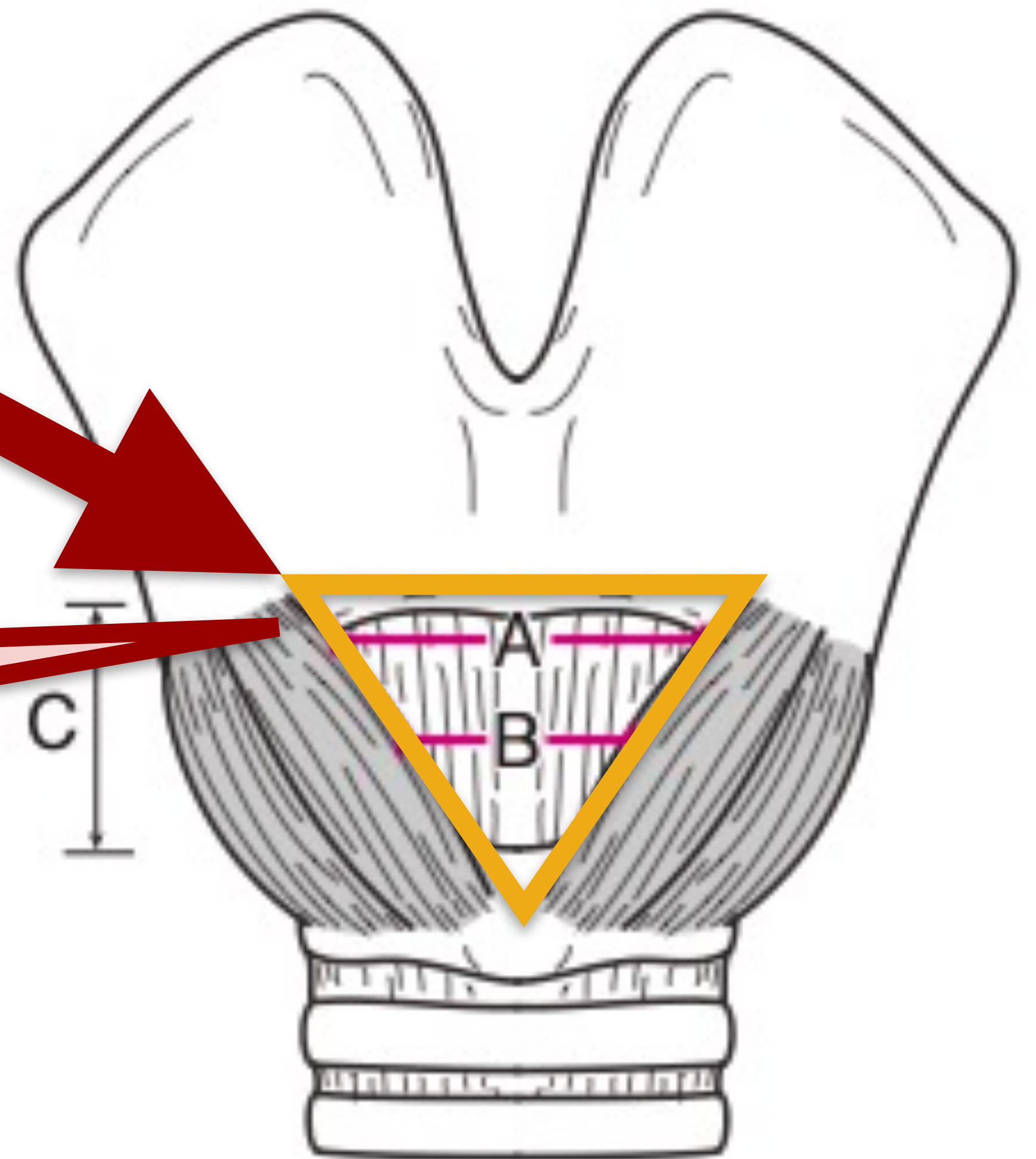


ここの部位の名前？

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輪状甲状靱帯？
輪状甲状膜？
輪状甲状間膜？

本稿では
輪状甲状間膜



気道確保のアルゴリズム

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確実な気道確保の適応

はい

気道確保

いいえ

挿管困難が予想される

いいえ

直視下経口挿管

はい

直視下経口挿管
試行 2回まで

はい

盲目的経鼻挿管
内視鏡下挿管
意識下経口挿管

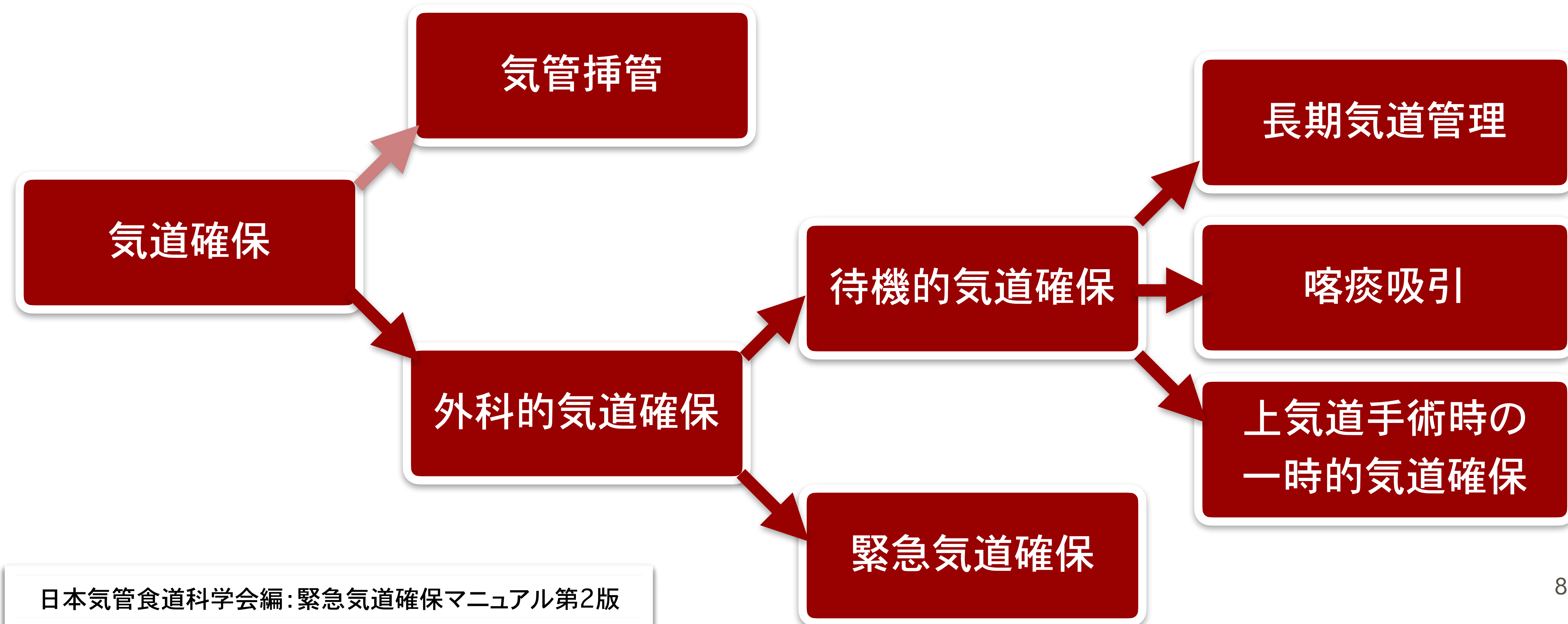
できず

できず

外科的
気道確保

気道確保の方法

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外科的気道確保の種類

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アプローチ部位	穿刺法 経皮的アプローチ部位	外科的切開法
輪状甲状間膜	輪状甲状間膜穿刺術	輪状甲状間膜切開術
気管	経皮的気管切開術	外科的気管切開術

外科的気道確保の選択

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時間に余裕なし

右方ほど確実な気道確保

時間に余裕あり

輪状甲状間膜穿刺術

可及的速やかに他の
確実な気道確保へ

輪状甲状間膜切開術

12歳以下では
原則禁忌

気管切開術

注意すべき
状態

- 1 出血傾向
- 2 近接部に腫瘍や血腫がある
- 3 輪状甲状間膜を同定できない
- 4 穿刺切開部位より遠位に気道狭窄がある

気道確保のタイミング分類

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待期的気道確保

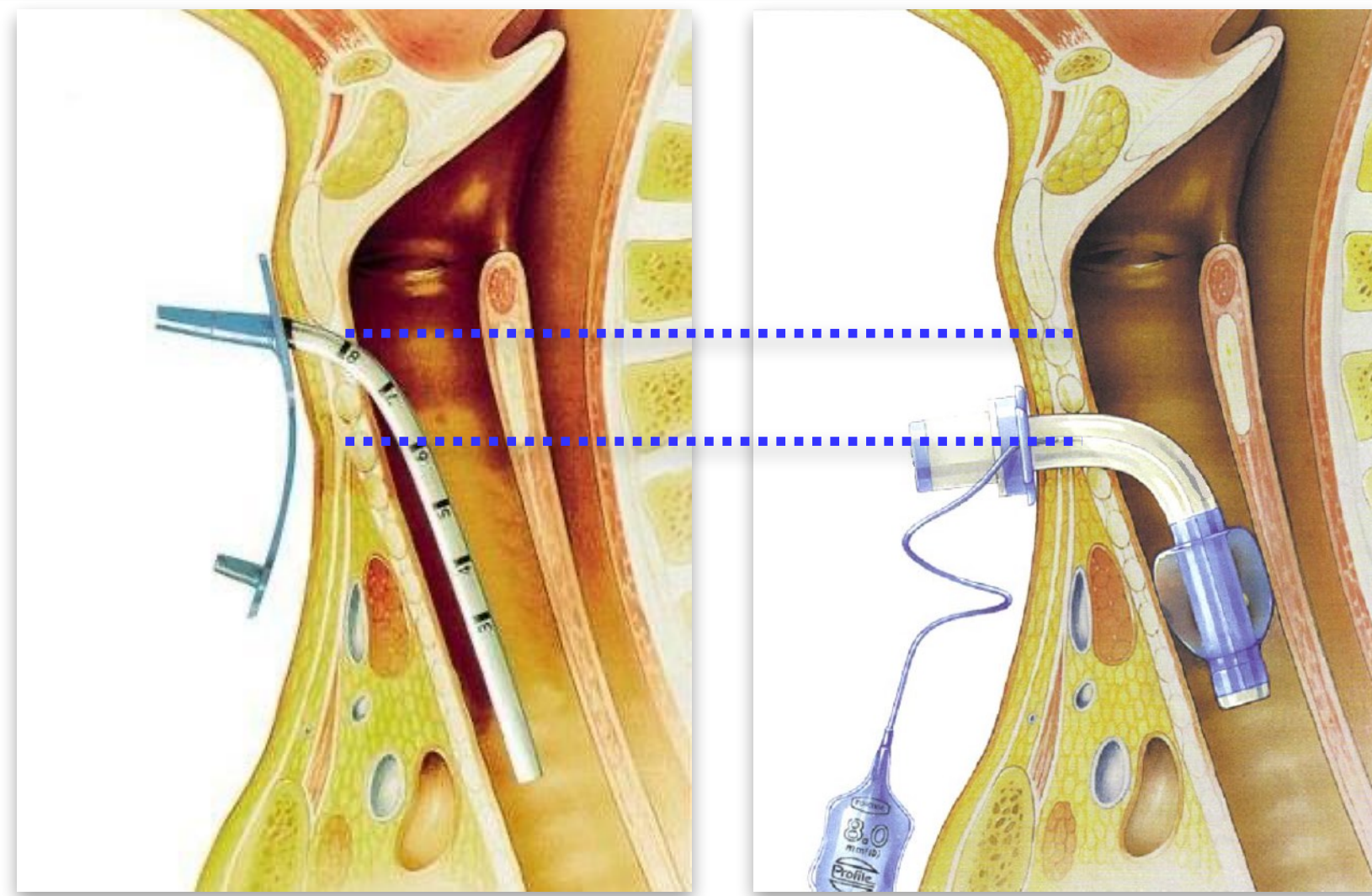
時間的余裕あり
すでに気管内挿管
頭頸部癌術前

緊急気道確保

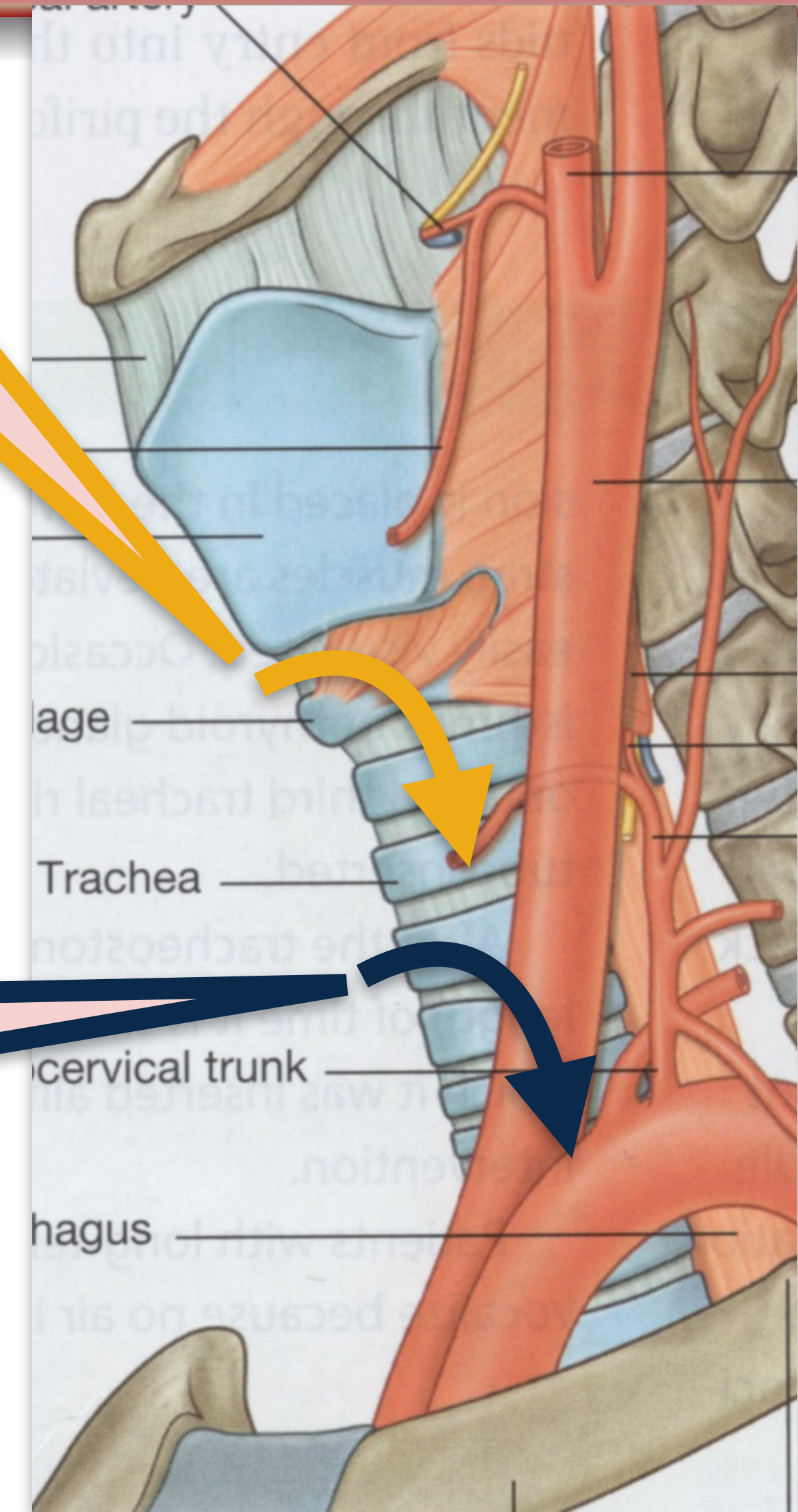
時間的余裕なし
気道緊急

アプローチ部位による分類

輪状甲状靱帯穿刺・切開術



気管切開術



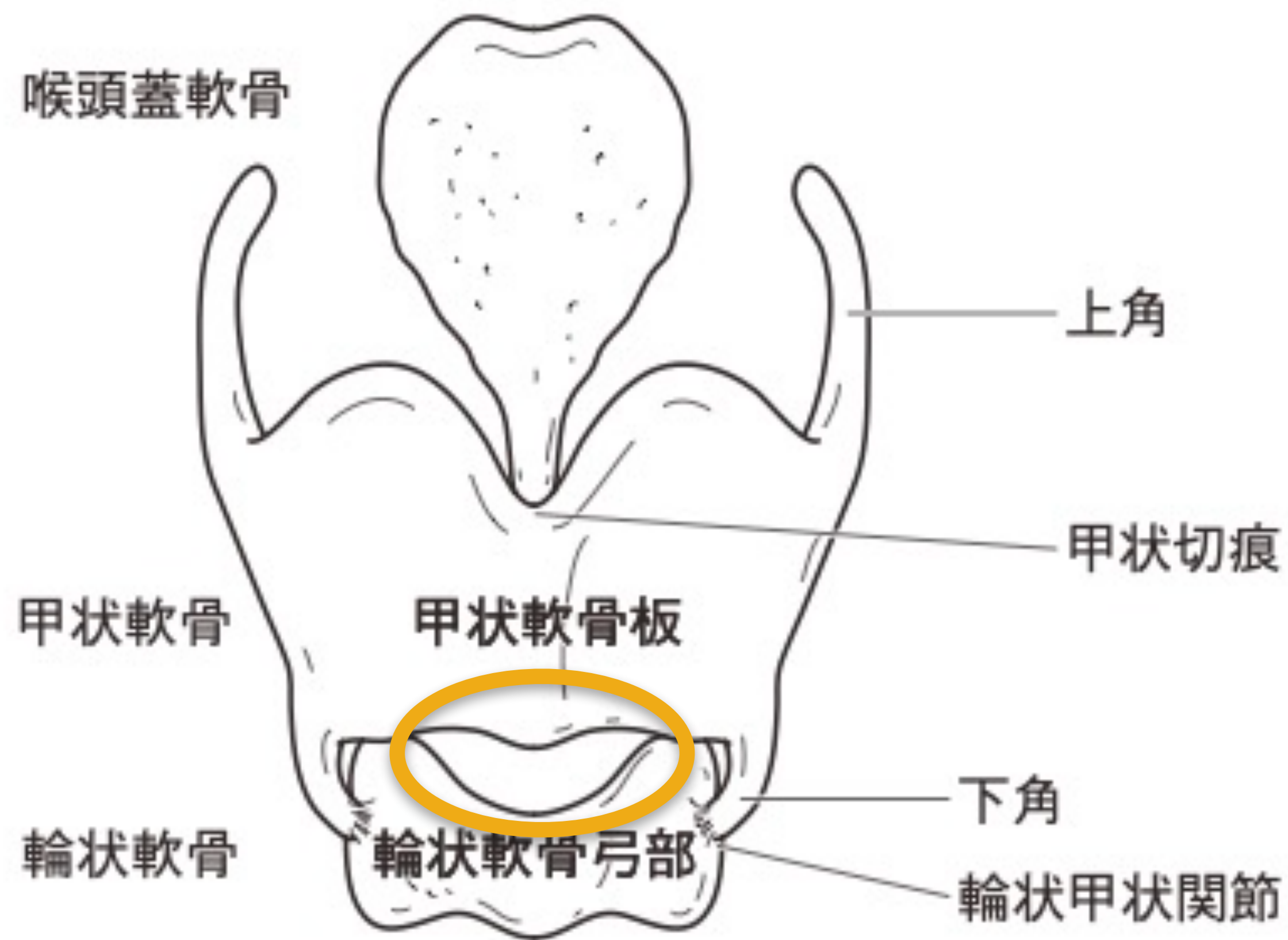
解剖

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喉頭を構成する軟骨

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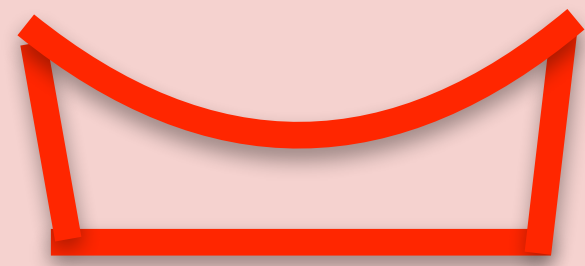


甲状軟骨下縁
輪状軟骨上縁
の間が
輪状甲状間膜
です

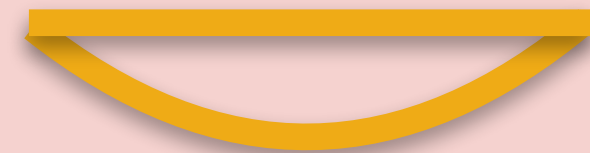


軟骨：触診してみよう

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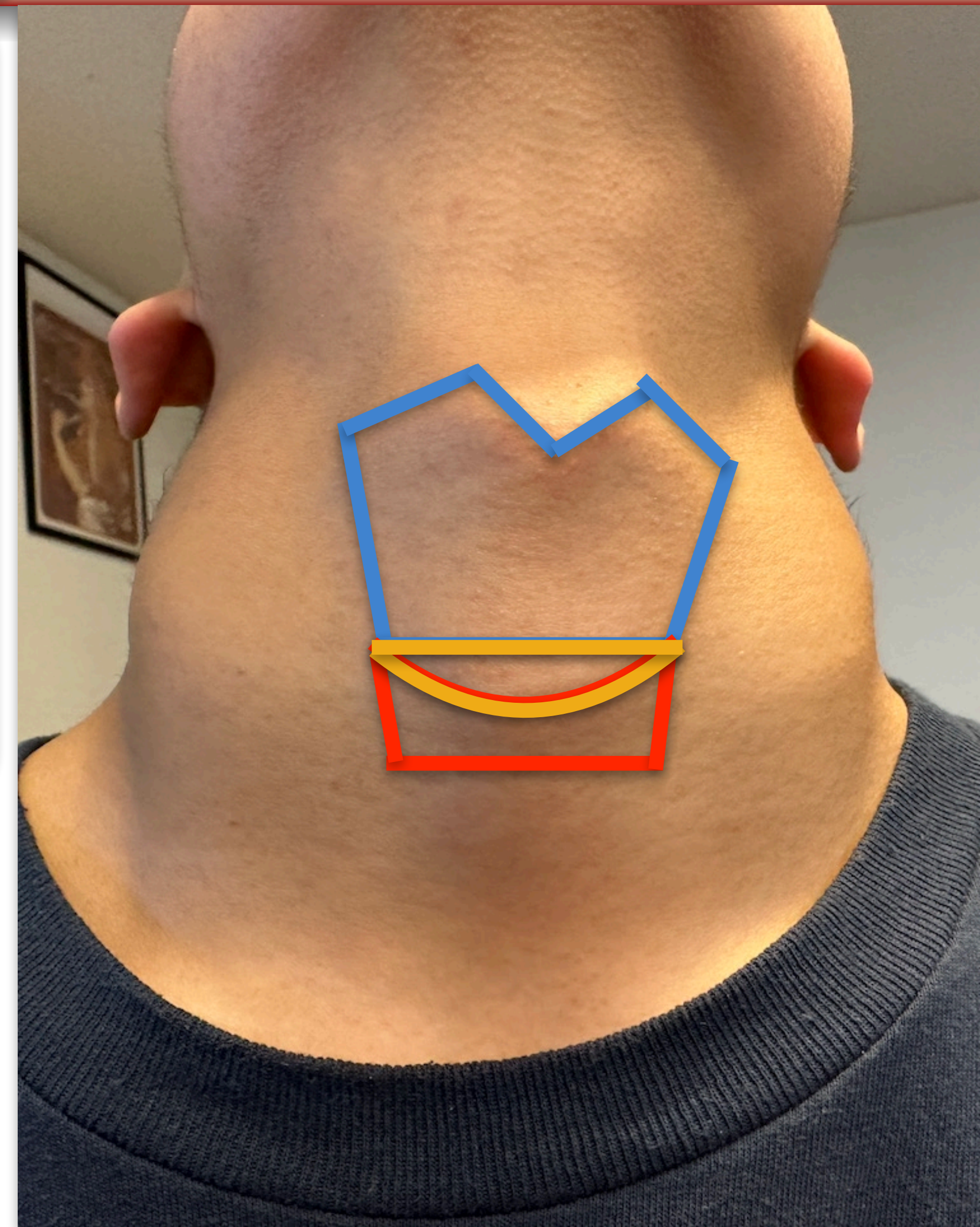
輪状軟骨



あいだが
輪状甲状間膜です



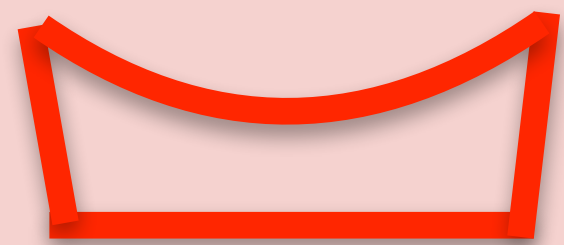
甲状軟骨



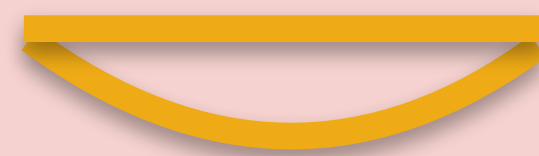
10歳代後半 男性

軟骨：触診してみよう

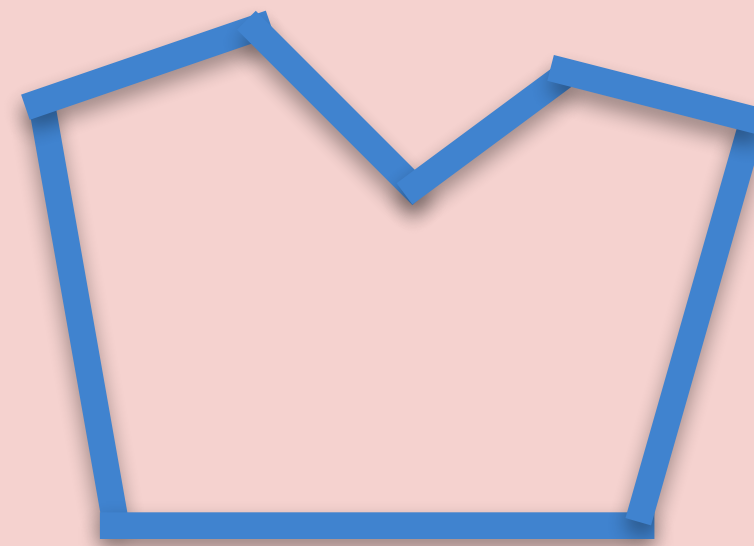
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輪状軟骨



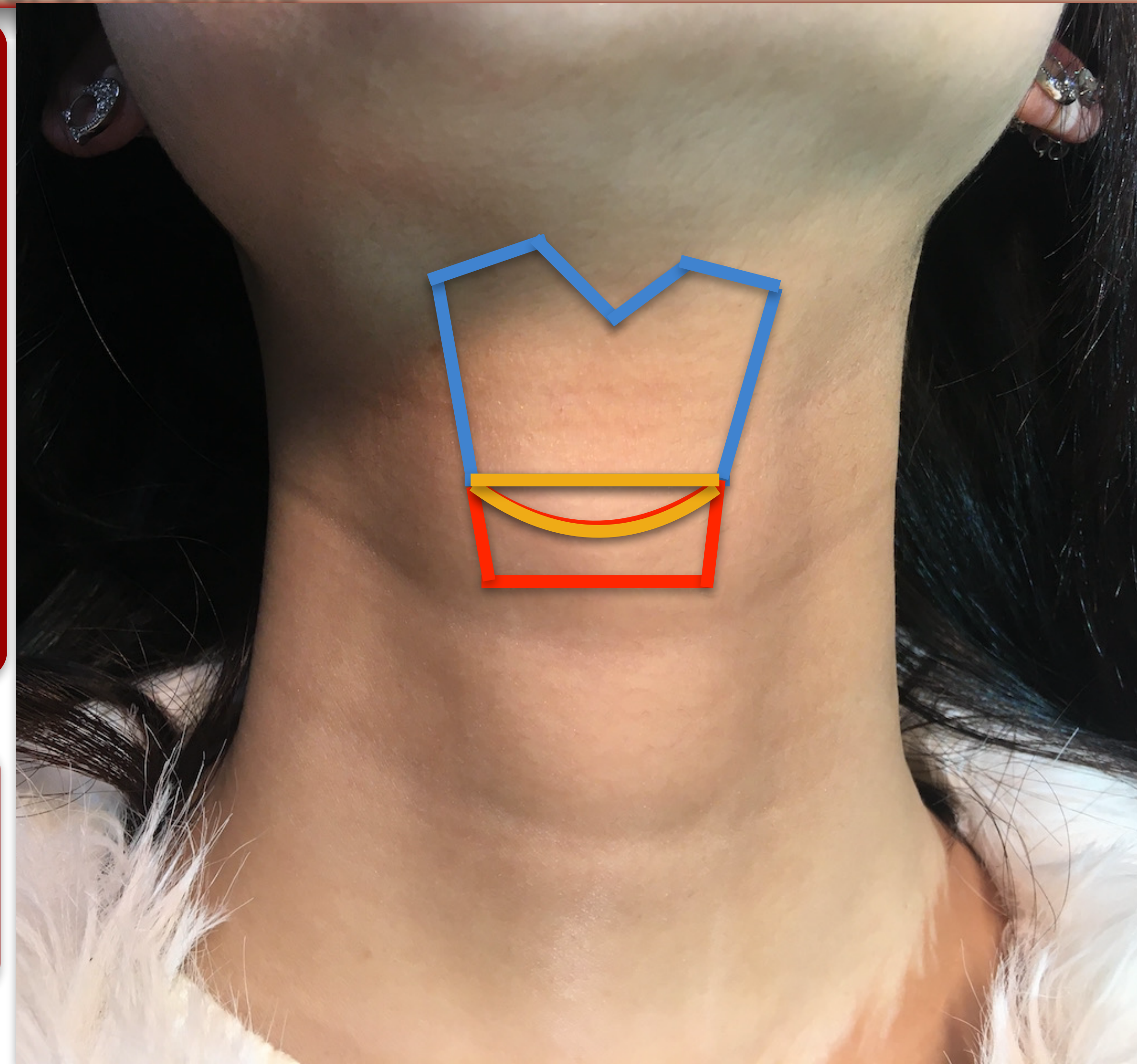
あいだが
輪状甲状間膜です



甲状軟骨

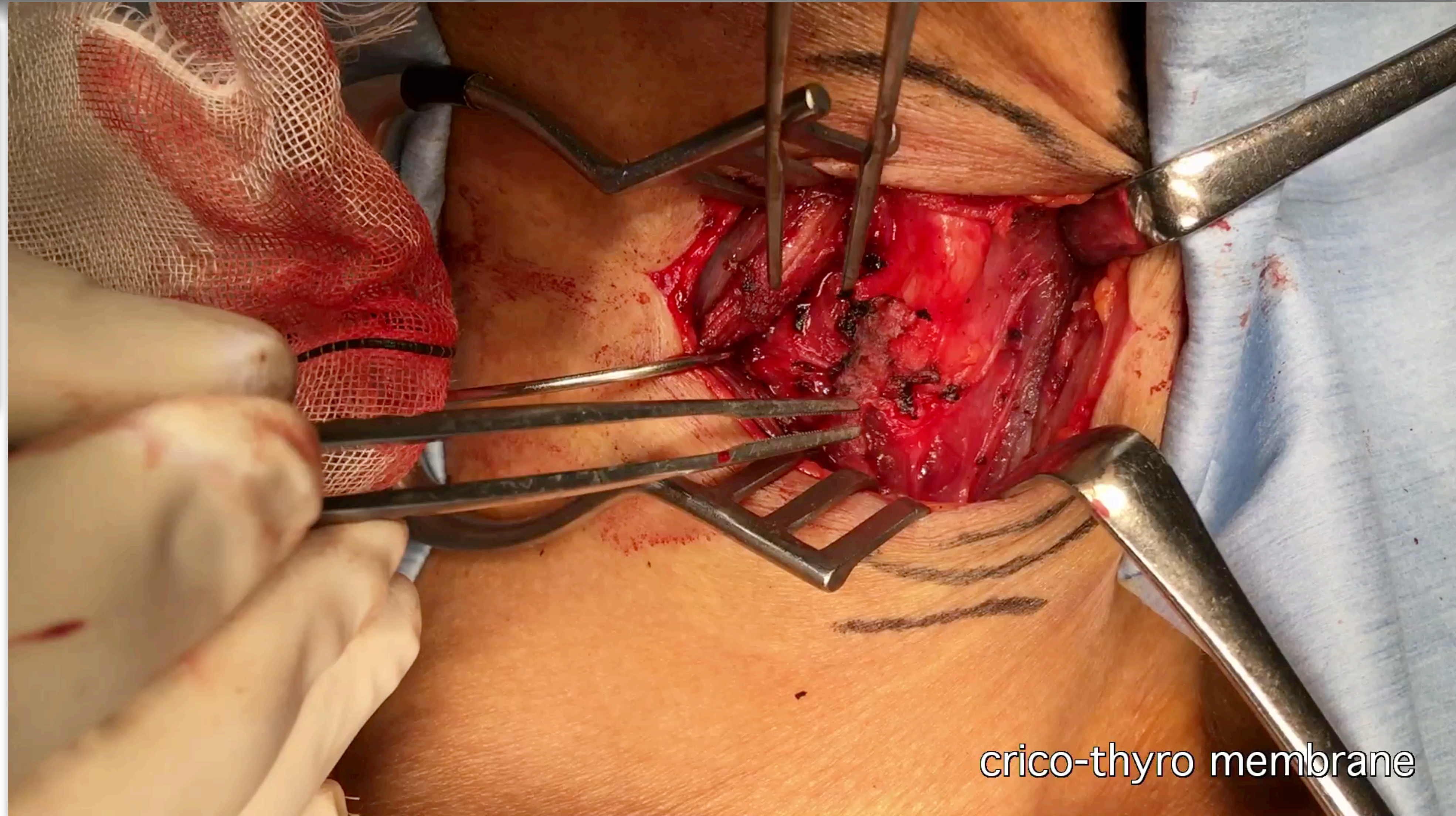


20歳代前半 女性



軟骨：手術中にみてみよう

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crico-thyroid membrane



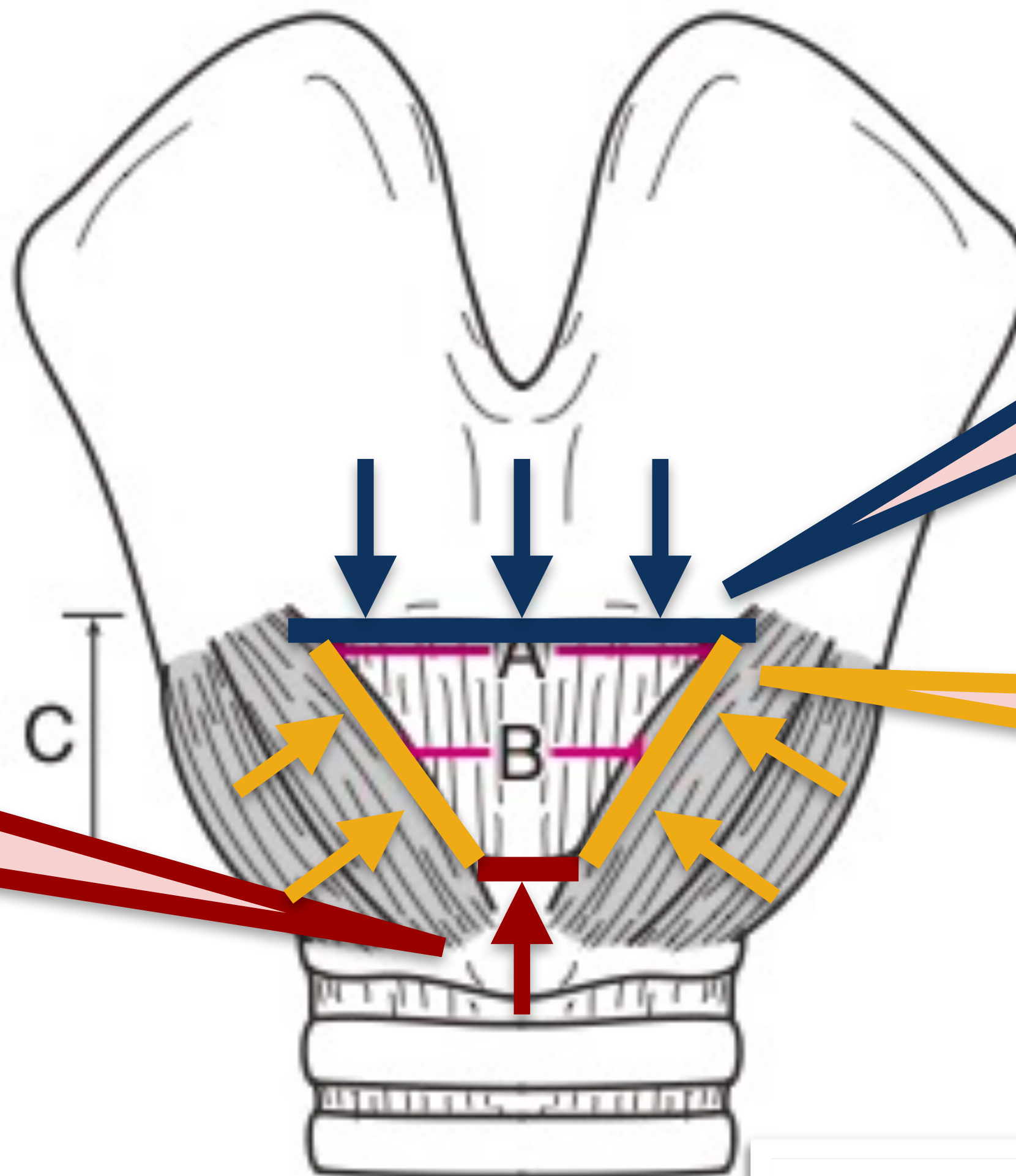
輪状甲状間膜周辺の解剖

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足側
輪状軟骨上縁

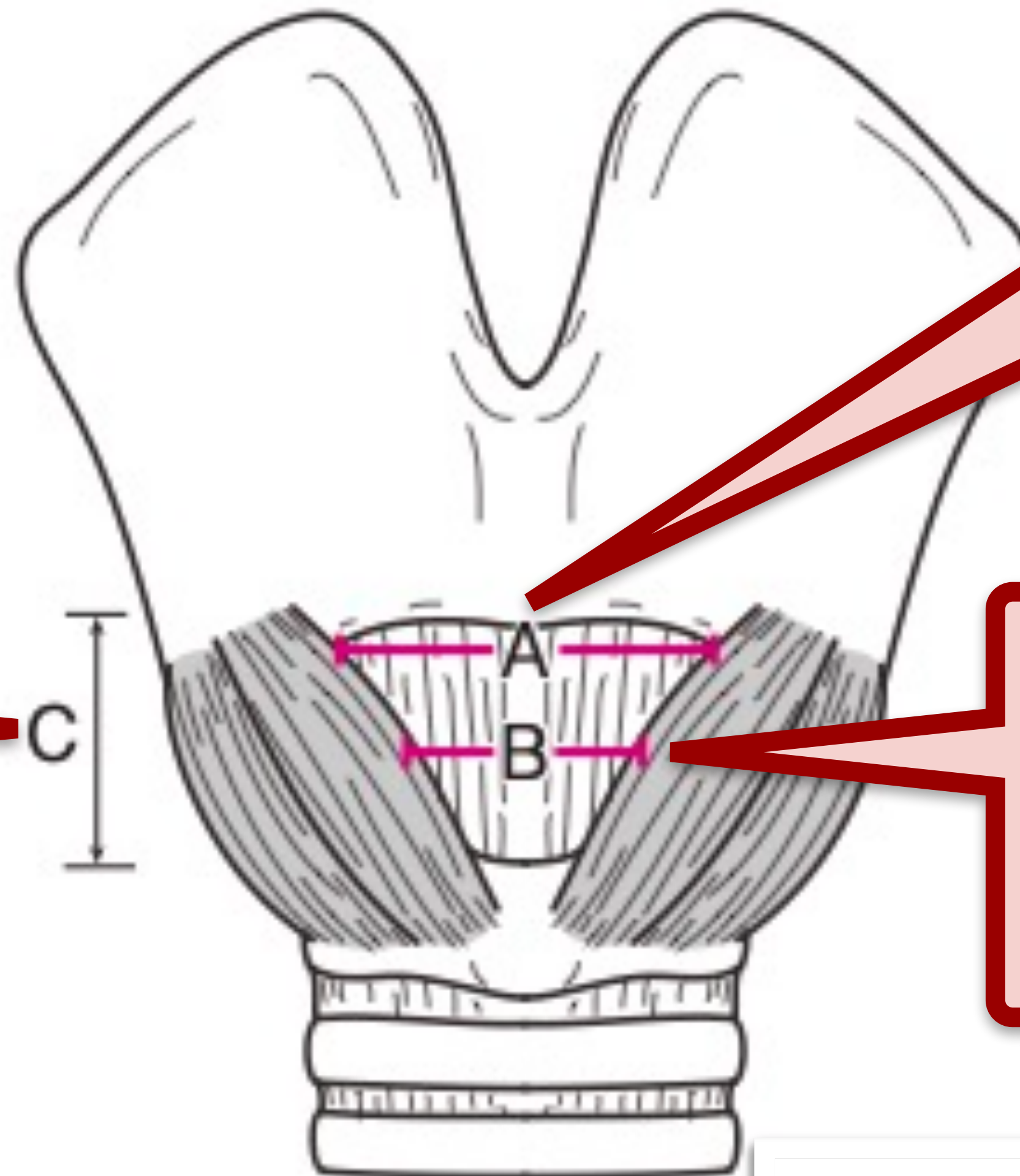
頭側
甲状軟骨下縁

外側
輪状甲状筋



輪状甲状間膜のサイズ

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A

男性 11mm
女性 9mm

B

男性 9mm
女性 6mm

C

男性 10mm
女性 9mm

Dover 1996
宮本 2001

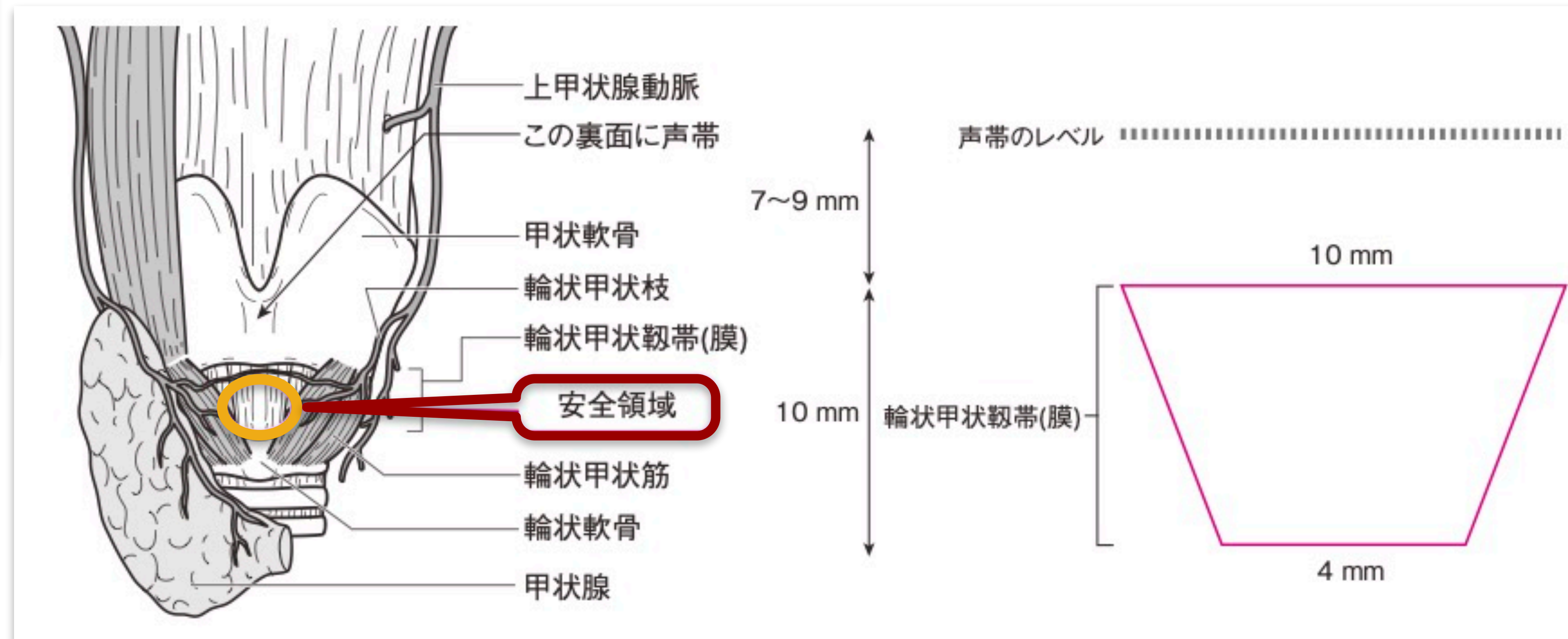
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安全領域

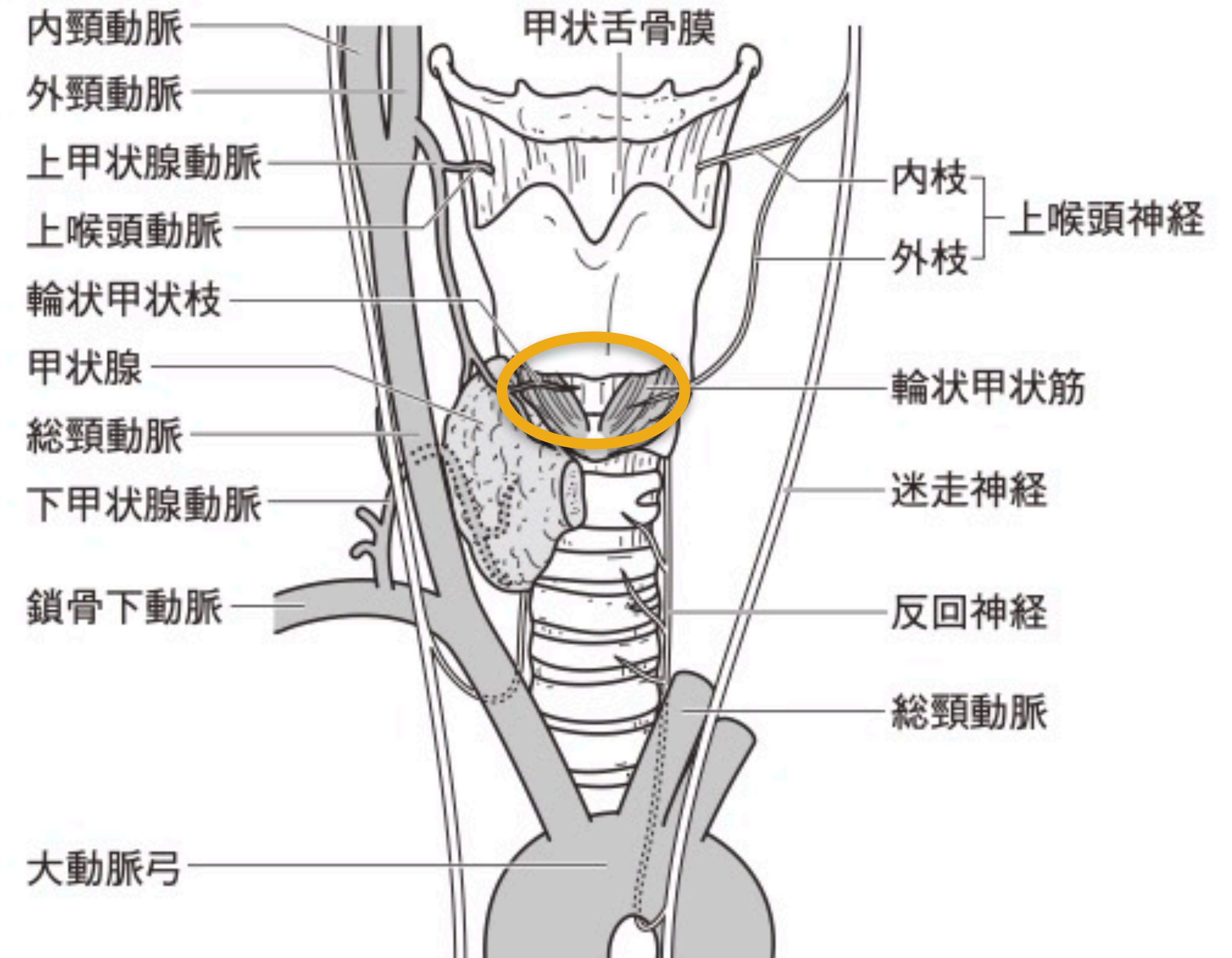
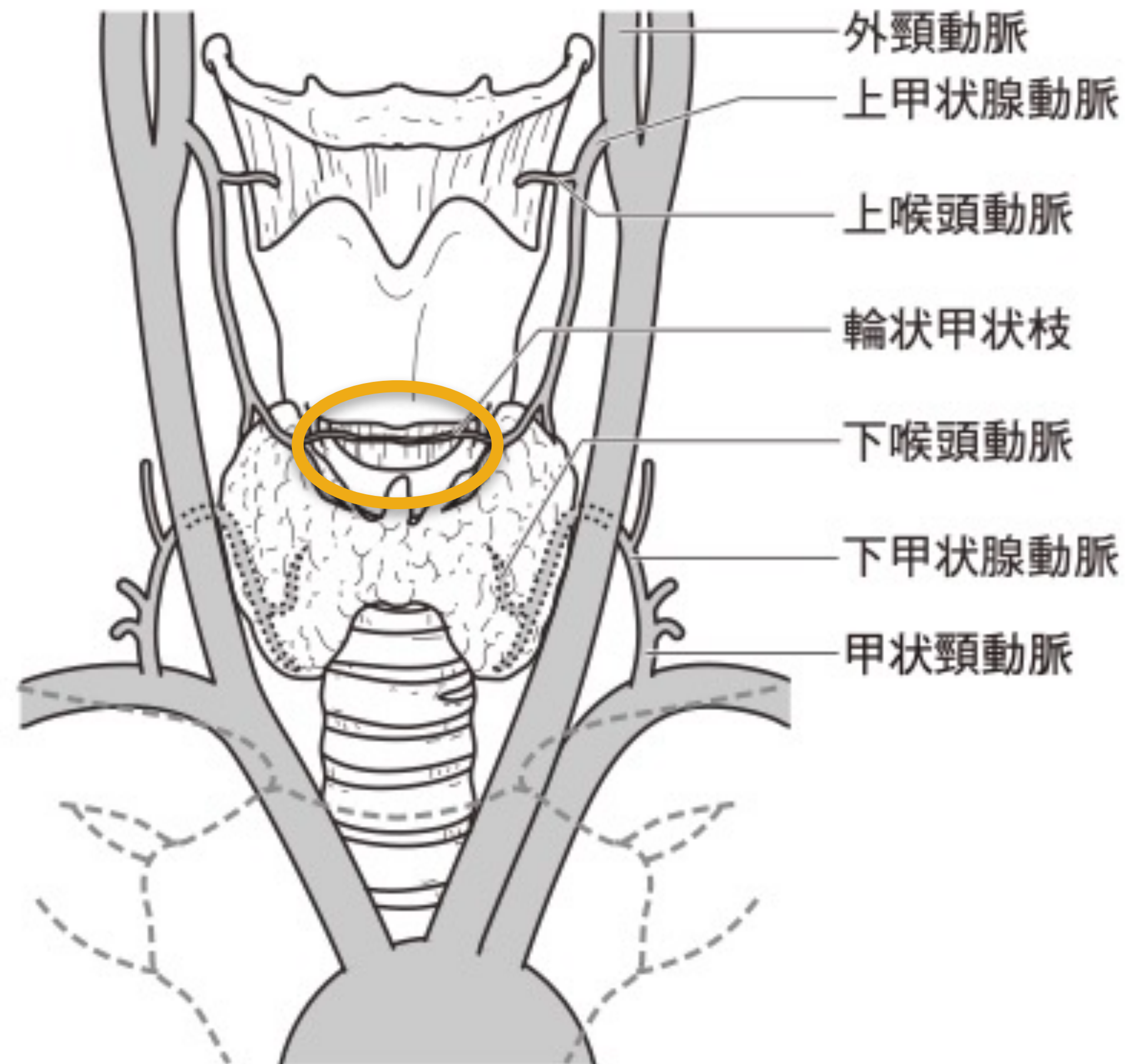
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安全領域は
ここ！



輪状甲状間膜周辺の解剖

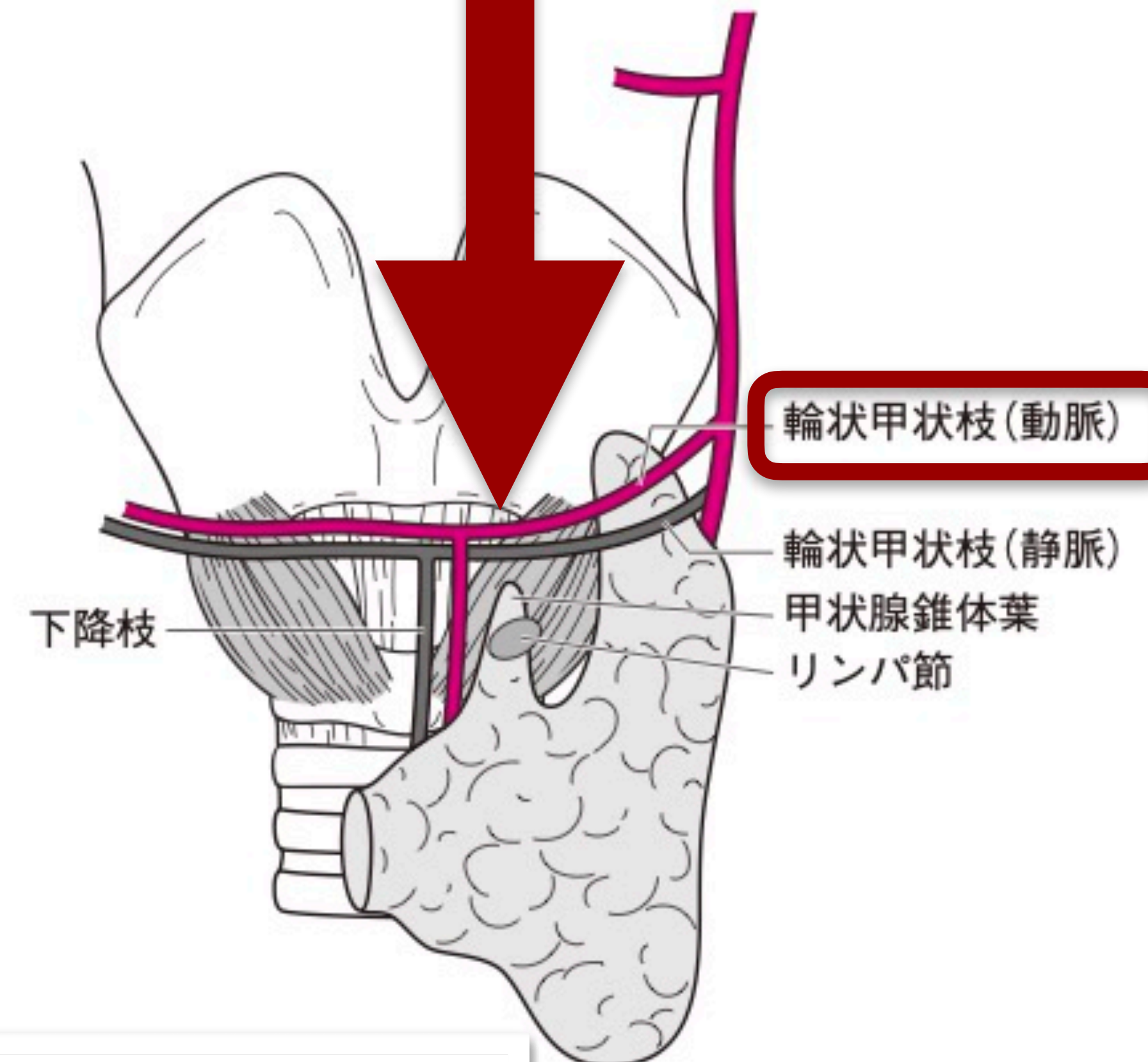
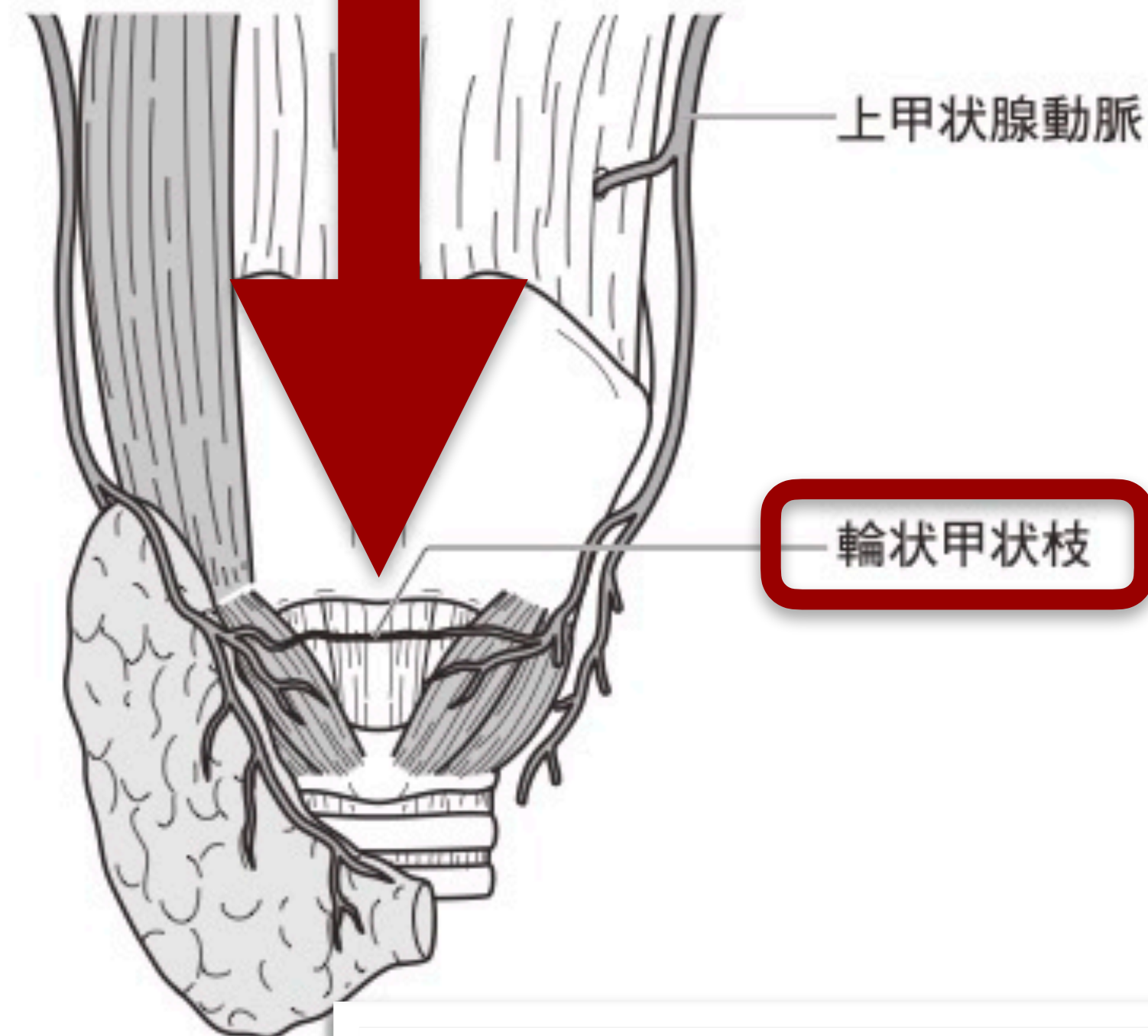
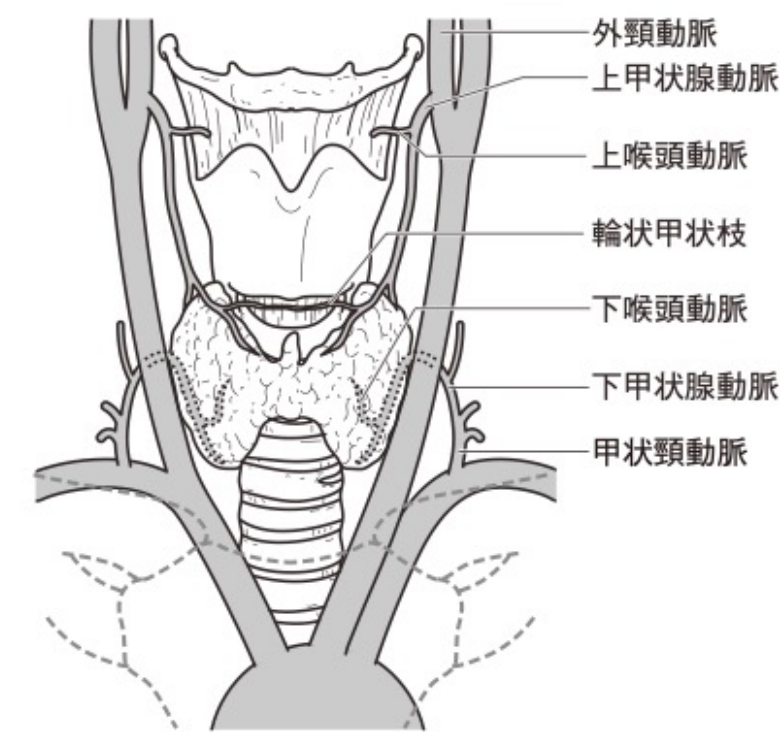
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要注意：上甲状腺動脈輪状甲状腺枝

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上甲状腺動脈
輪状甲状腺枝



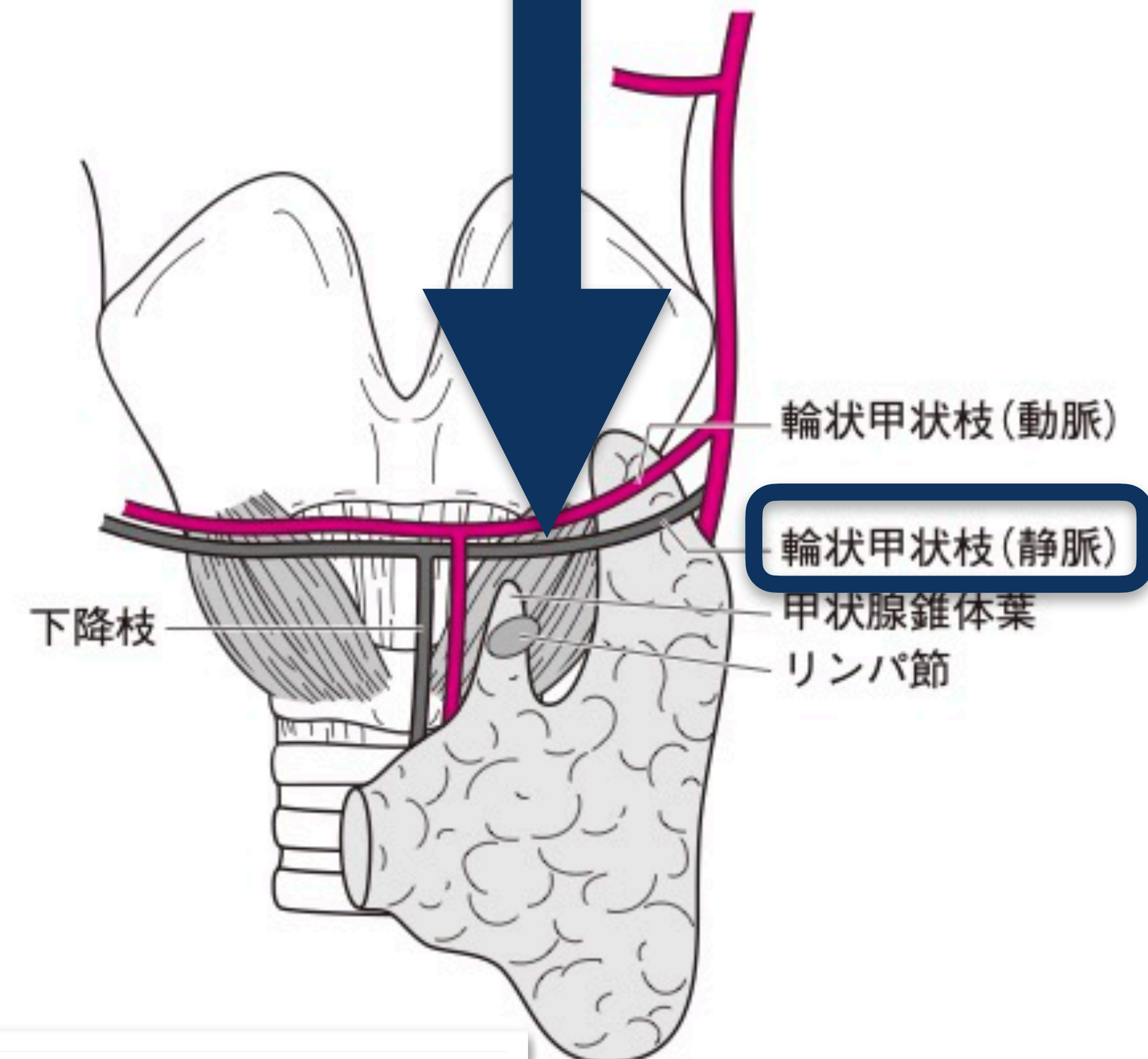
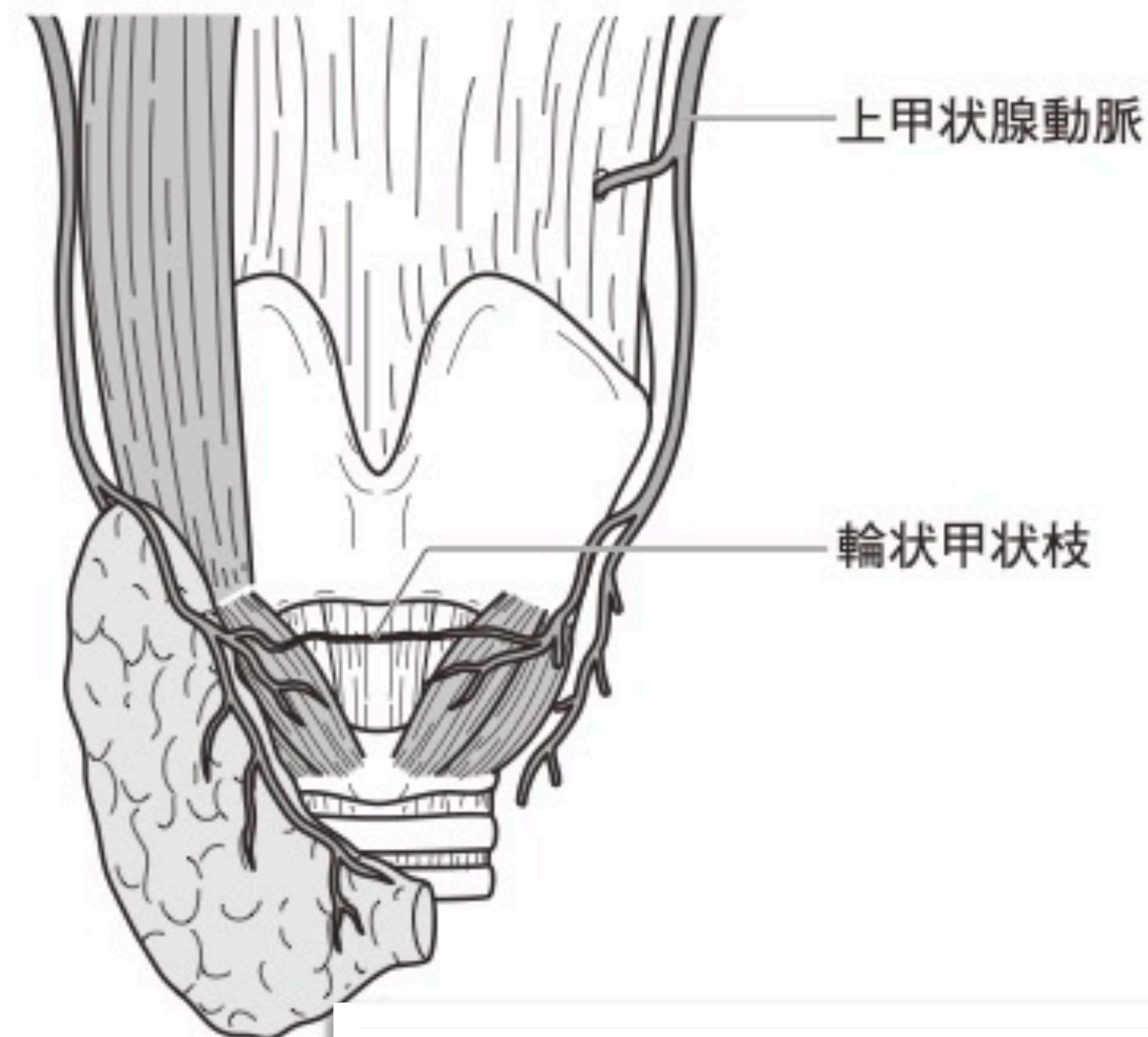
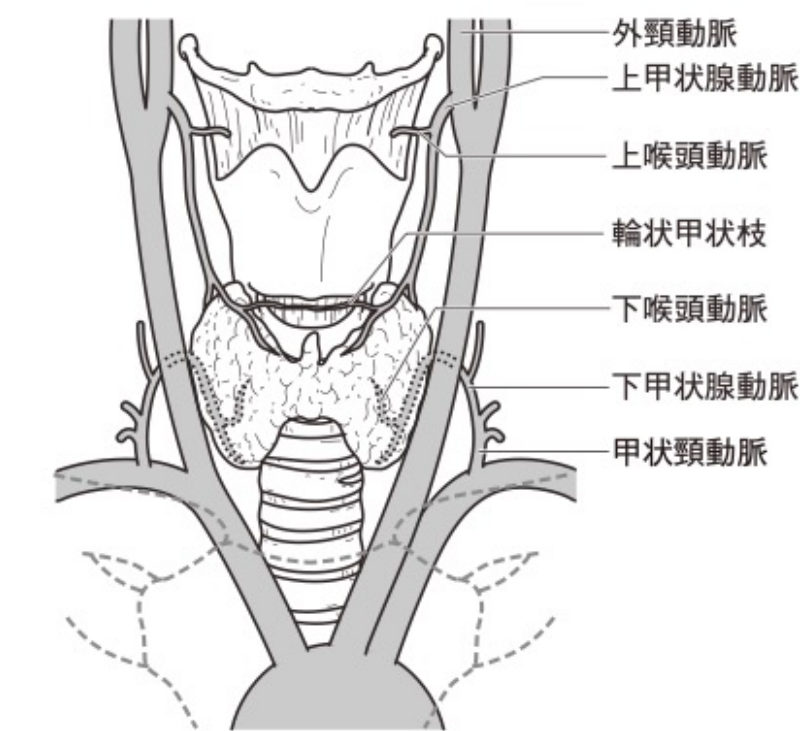
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注意：上甲状腺静脈輪状甲状腺枝

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上甲状腺静脈 輪状甲状腺枝



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輪状甲状間膜付近の血管

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正中に血管あり 10%
正中より左右10mmに血管あり 31%
Goumas 1997



The Journal of Laryngology and Otology
April 1997, Vol. 111, pp. 354-356

Cricothyroidotomy and the anatomy of the cricothyroid space. An autopsy study

P. GOUMAS*, K. KOKKINIS*, J. PETROCHEILOS*, S. NAXAKIS*, G. MOCHLOULIS†

Abstract

Airway management is one of the main dictums in anaesthesia, emergency medicine and critical care. Endotracheal intubation, tracheostomy and cricothyroidotomy are all approved methods to secure a patient's airway. Cricothyroidotomy is performed in the space between the anterior inferior border of the thyroid cartilage and the anterior superior border of the cricoid cartilage. We studied 107 autopsies with special interest in the anatomy of the cricothyroid space.

Key words: Tracheostomy; Anatomy; Autopsy; Tracheotomy

Introduction

With the publication of Chevalier Jackson's landmark article (Jackson, 1921) the use of cricothyroidotomy was condemned because of the high rate of complications including subglottic stenosis.

It was not until the 1970's that cricothyroidotomy began to gain generalized acceptance (Brantigan and Grow, 1976) and it is now a well established method for accessing a patient's airway (Melker and Florete, 1995). Cricothyroidotomy is a technique that provides an opening in the middle line of the space between the anterior inferior border of the thyroid cartilage and the anterior superior border of the cricoid cartilage for the purpose of gaining access to the airway (Caparosa and Zavatsky, 1957). This area is considered to be the most accessible part of the respiratory tree below the glottis.

The purpose of our study was to examine the anatomical structures of the cricothyroid space within 1 cm proximity of the middle line. Damage of these structures during a cricothyroidotomy can potentially cause complications that may lead to increased morbidity and mortality.

Materials and methods

Over an 18-month period, we examined 107 autopsies in order to study the anatomy of the cricothyroid space. Patients with known pathology or previous surgery in the area were excluded.

We studied 70 men and 37 women aged between 18 and 79 years of age. Structures of interest were arteries, veins and any tissue situated in the cricothyroid space.

We also tried to map the above mentioned structures in relation to the middle line and their distance from it (Figure 1). Veins with a diameter greater than 2 mm were considered important, so an effort was made to find their exact location.

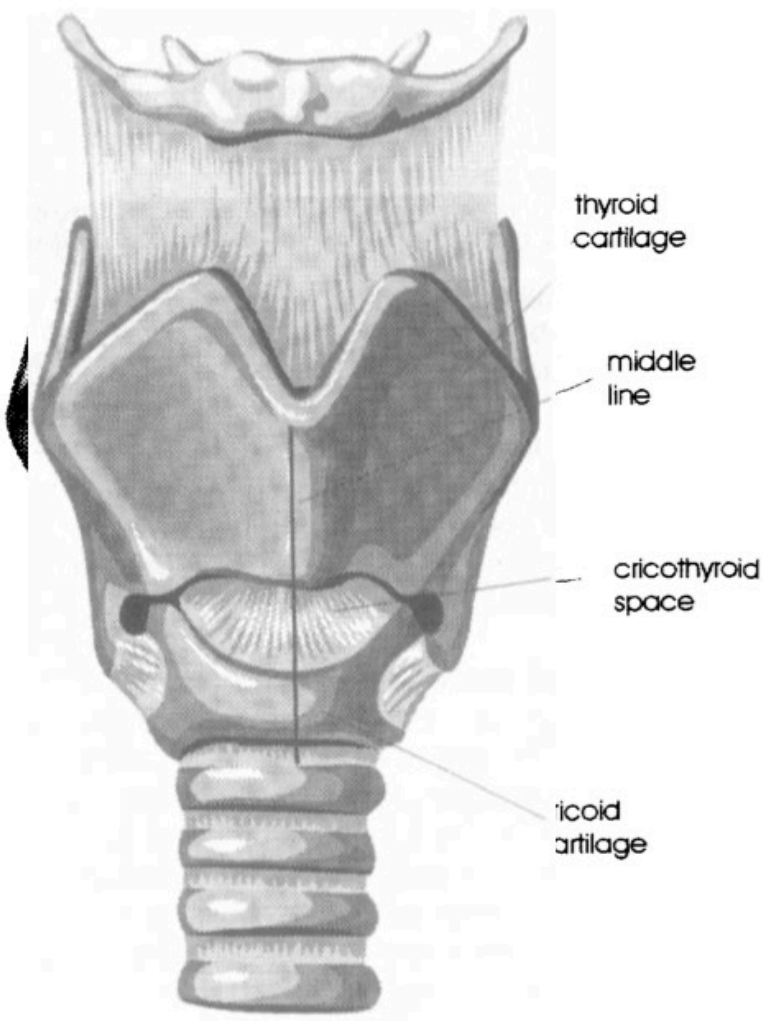


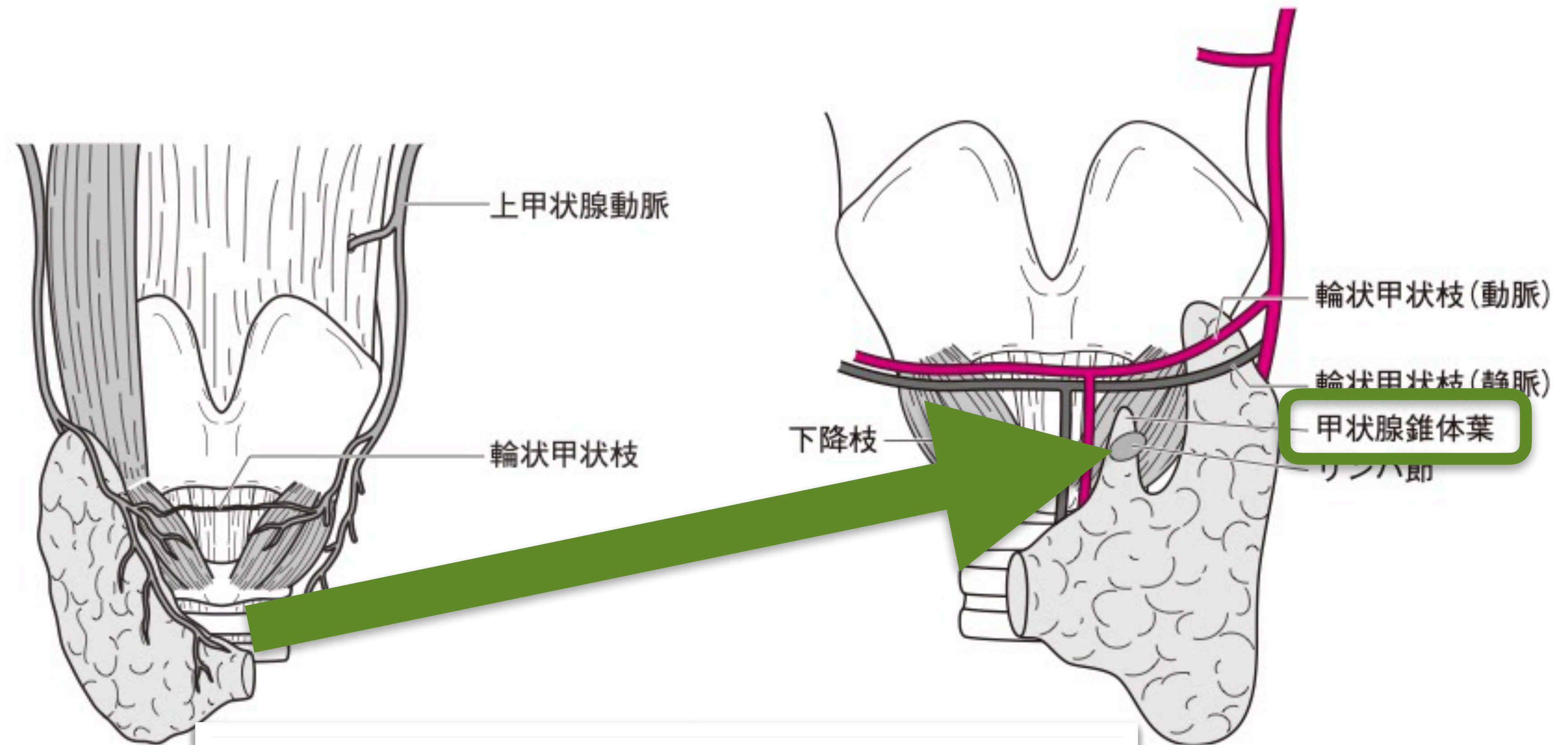
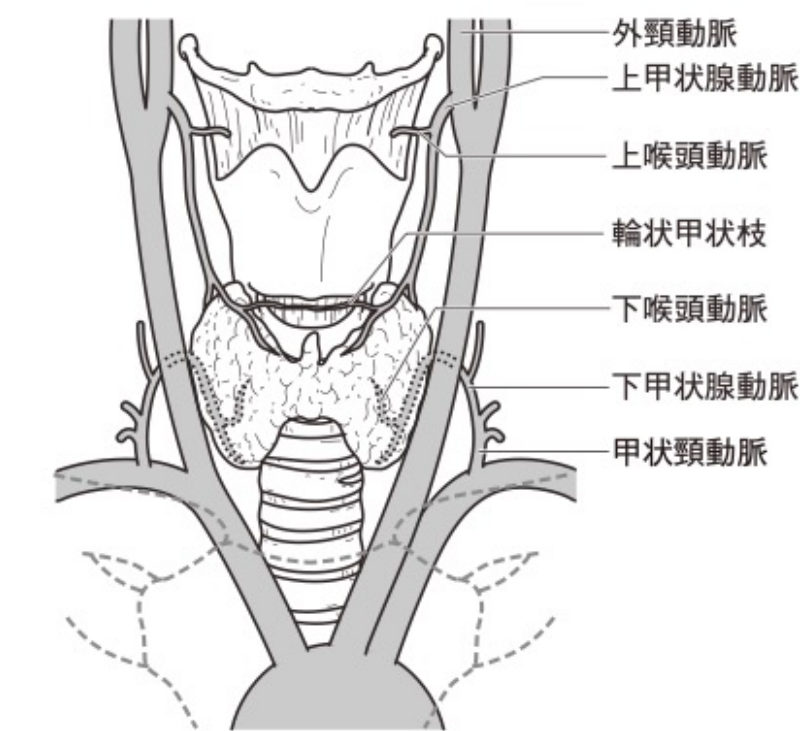
FIG. 1
Cricothyroid space: the area of interest.

From the Department of Otolaryngology – Head and Neck Surgery*, University of Patras, Medical School, Greece, and the Department of Otolaryngology – Head and Neck Surgery†, St Mary's Hospital, London, UK.
Accepted for publication: 25 February 1997.

要注意：甲状腺錐体葉

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甲状腺錐体葉
長い症例あり



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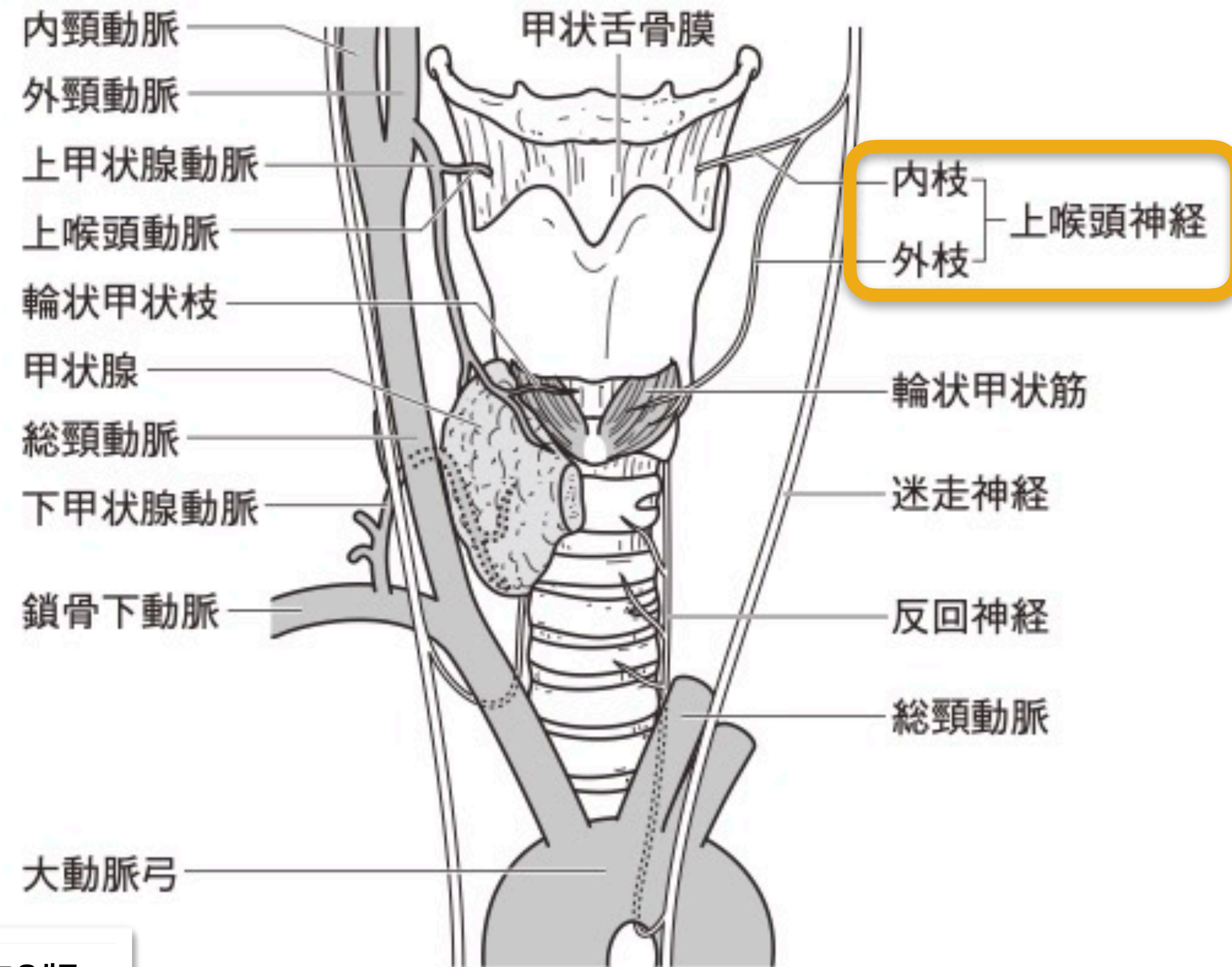


注意：上喉頭神経

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ちょっと遠いので
あまり気にする必要は
ないでしょう

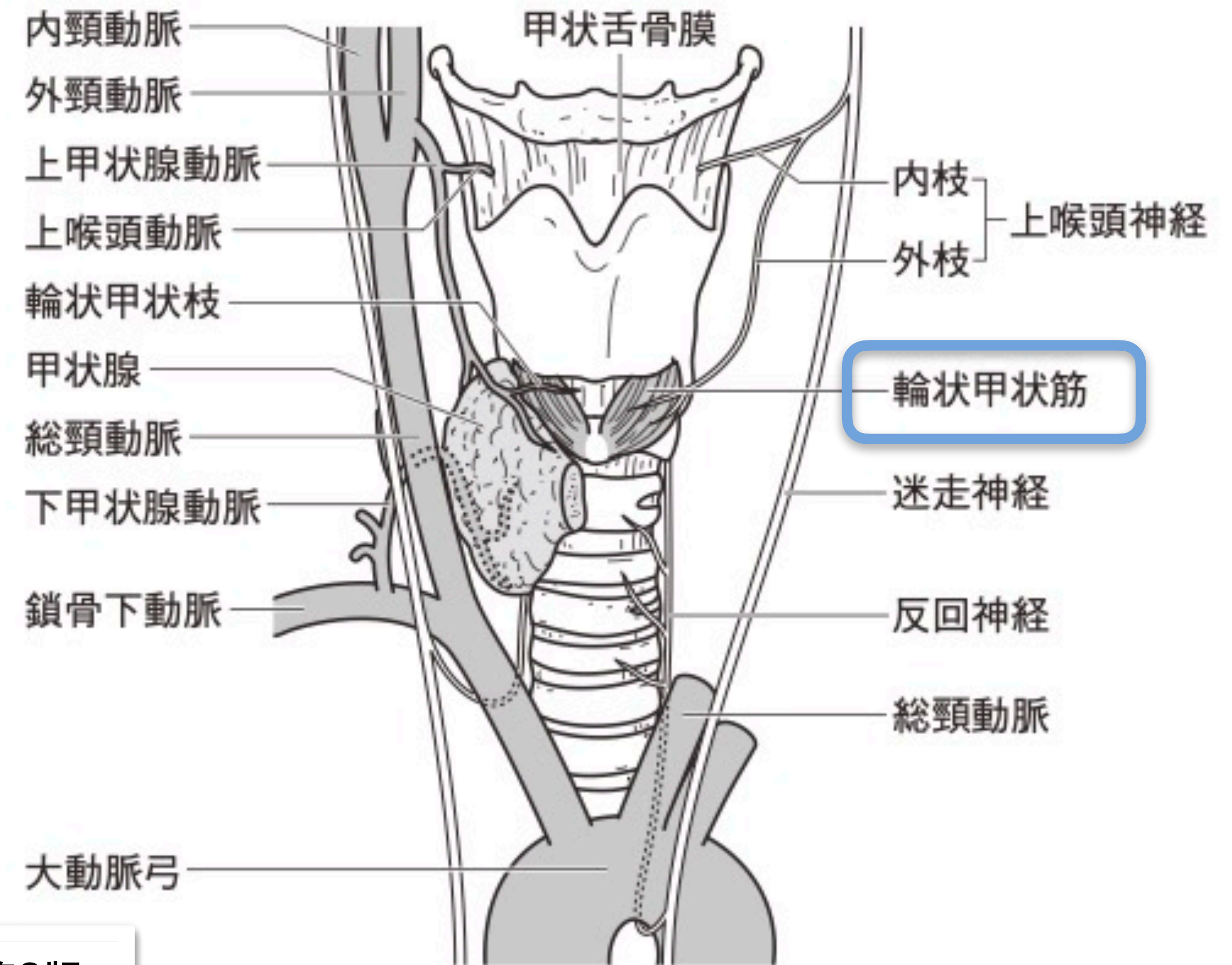
内枝 喉頭知覚
外枝 輪状甲状筋



心配なし：輪状甲状筋

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声を高くする筋肉
輪状甲状筋は
心配なし



輪状甲状靱帯穿刺・切開術

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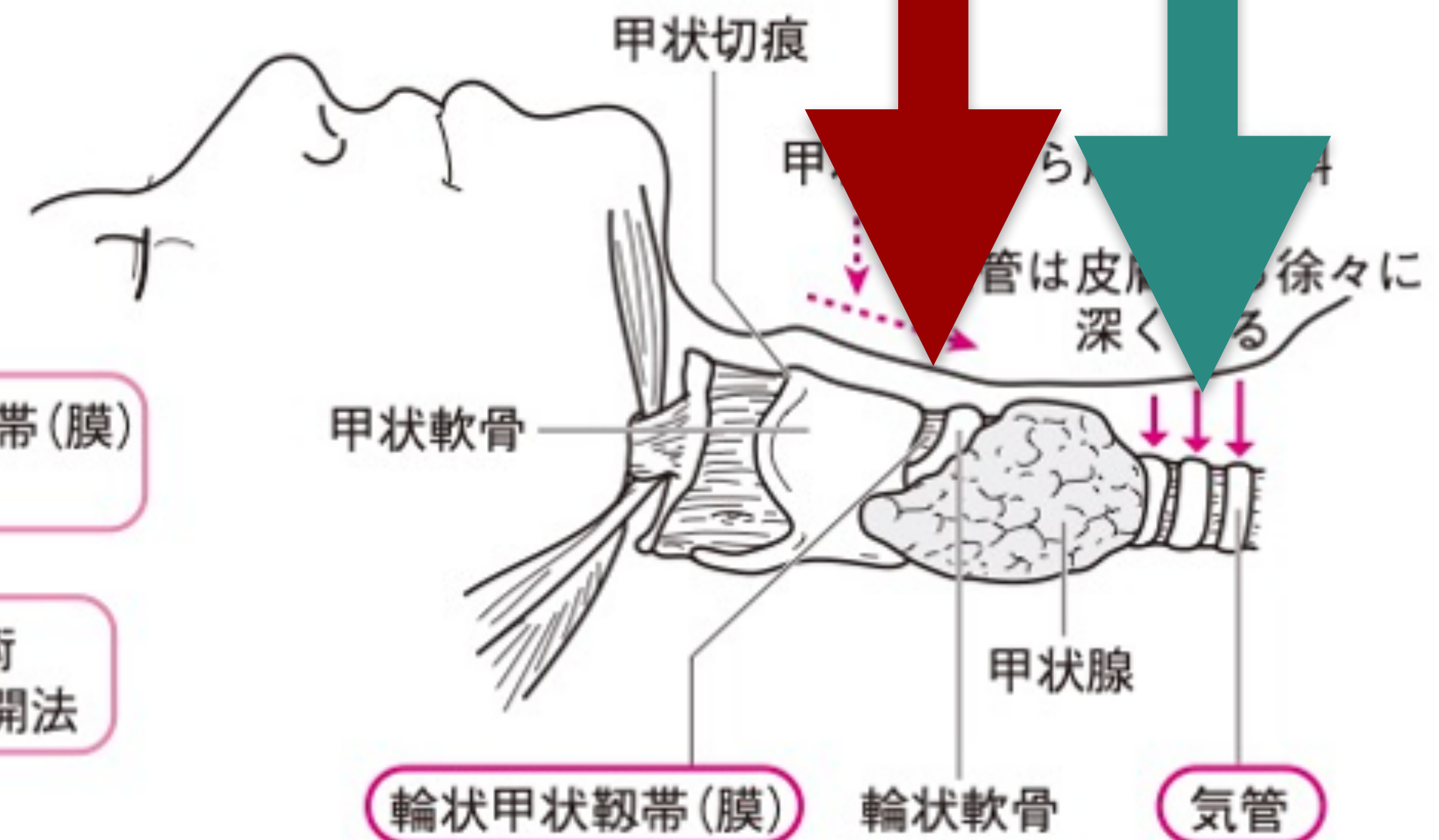
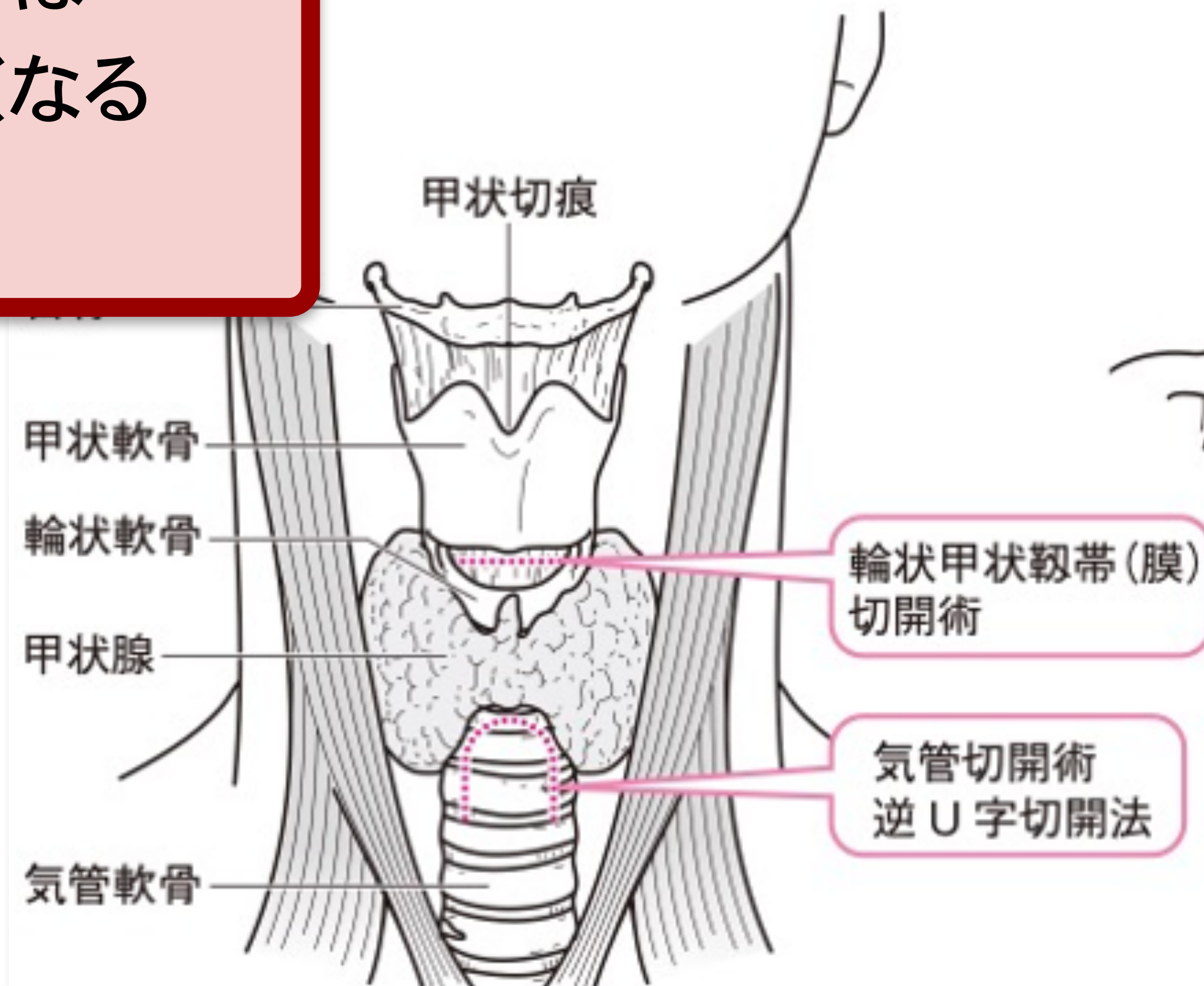


輪状甲状間膜は近い 気管は遠い

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足側に行けば
だんだん遠くなる



輪状甲状靱帯穿刺・切開術の適応

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緊急気道確保

喀痰自己排出困難症例における
吸痰ルート確保

輪状甲状靱帯穿刺・切開術の絶対的禁忌

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出血傾向

近接部に腫瘍や血腫がある

12歳以下→穿刺は禁忌ではない

輪状甲状靱帯が明確に同定できない

12歳以下に輪状甲状靱帯切開術は絶対的禁忌

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12歳以下には
穿刺のみ適応あり！

11歳男児
穿刺はここです！



輪状甲状靱帯穿刺・切開術の禁忌

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ほかにより低侵襲の気道確保方法がある

輪状甲状靱帯より遠位に気道狭窄がある

速い順は？

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輪状甲状間膜穿刺術

輪状甲状間膜切開術 メスのみ

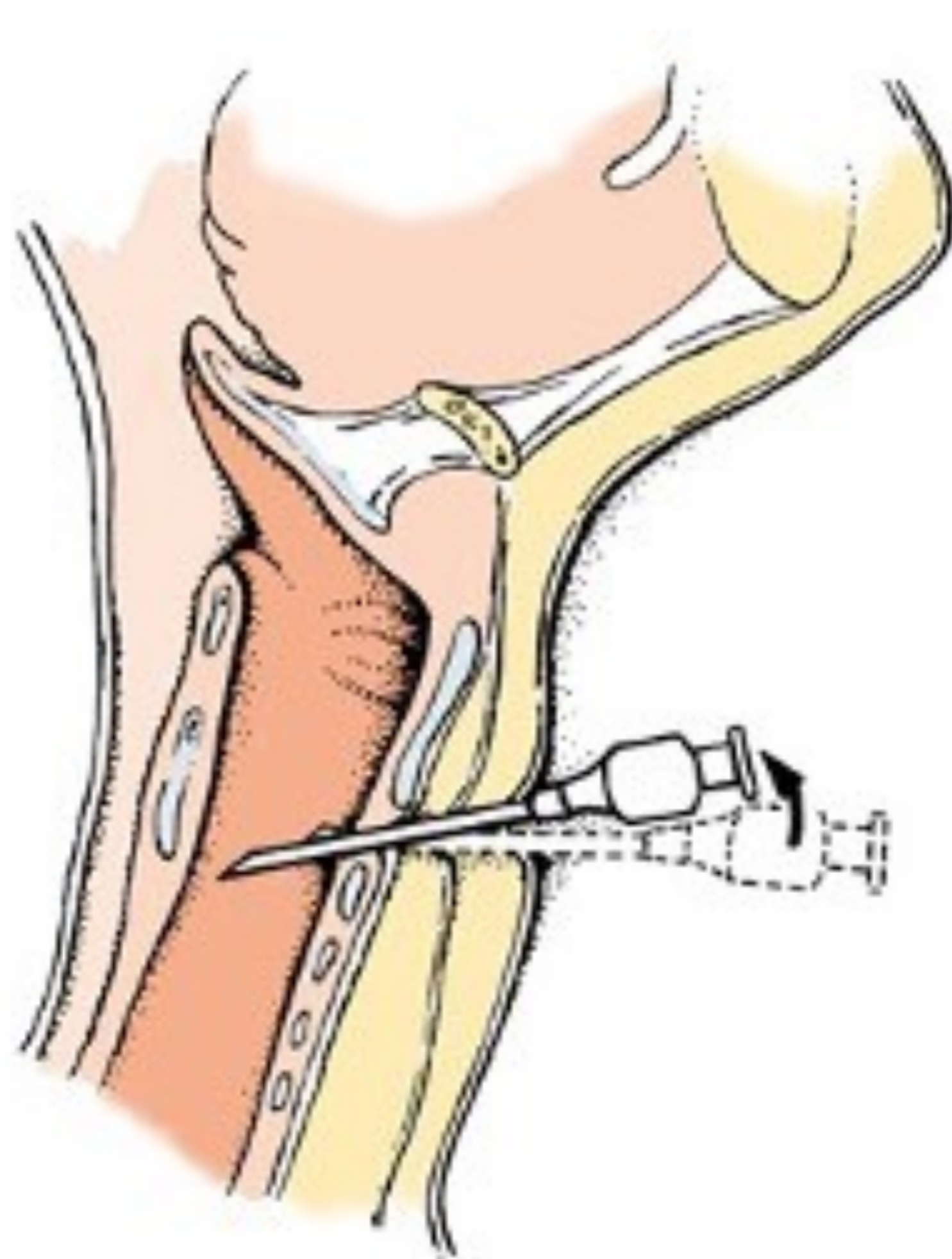
輪状甲状間膜切開術 メスとペアンのみ

輪状甲状間膜切開術 メスとペアンと挿管チューブ

輪状甲状間膜穿刺・切開キット

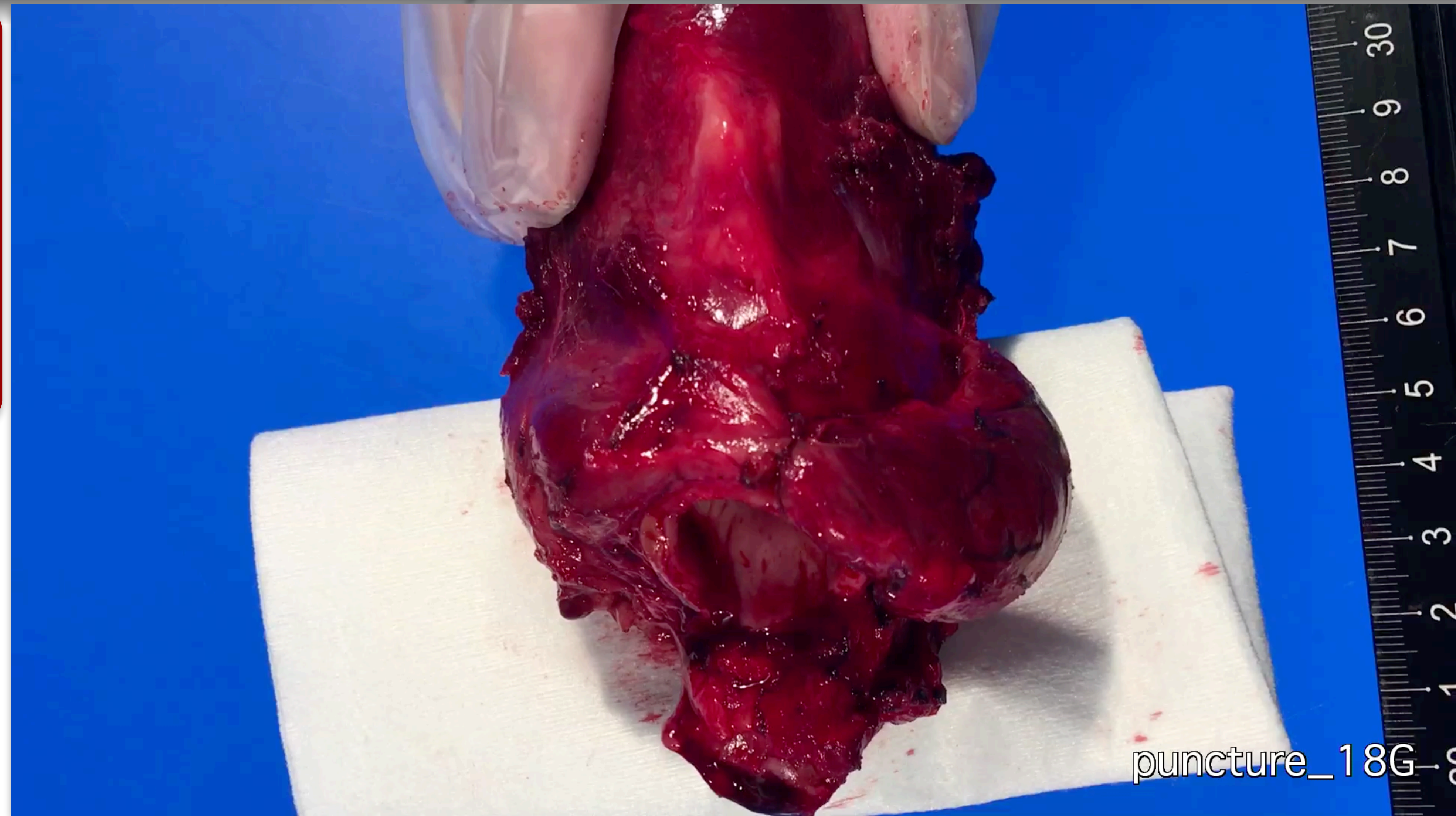
輪状甲状間膜穿刺: いちばんはいい

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輪状甲状間膜穿刺:いちばんはよい

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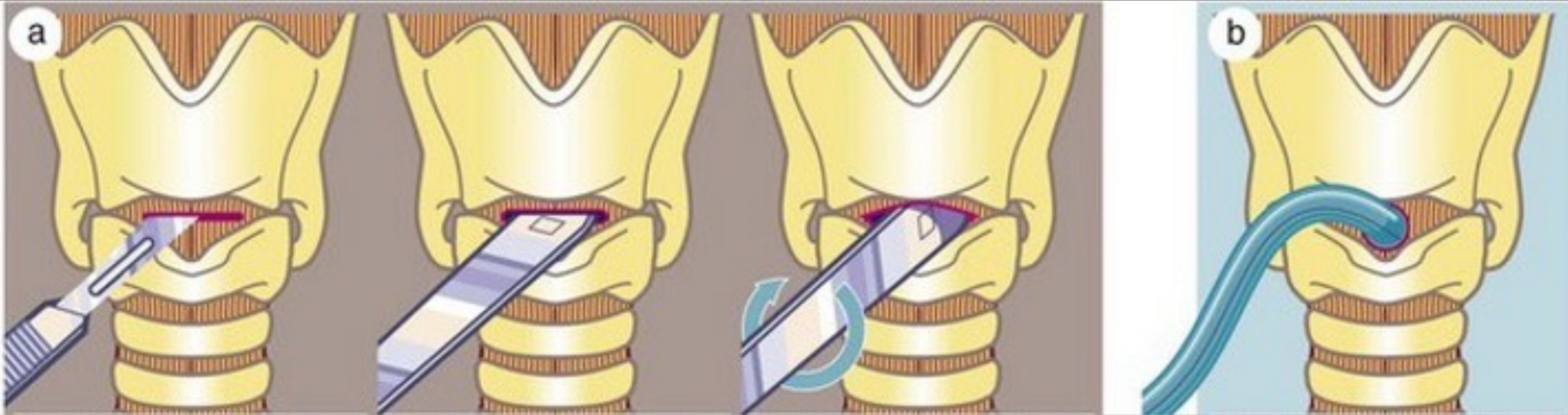
輪状甲状間膜穿刺: いちばんはよい

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輪状甲状間膜切開：メスのみ つぎにはやい

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メスホルダーをつっこんでひねるだけ!



東京医科大学
本橋玲先生

メスのみ つぎにはやい

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輪状甲状間膜切開：メスとペアン

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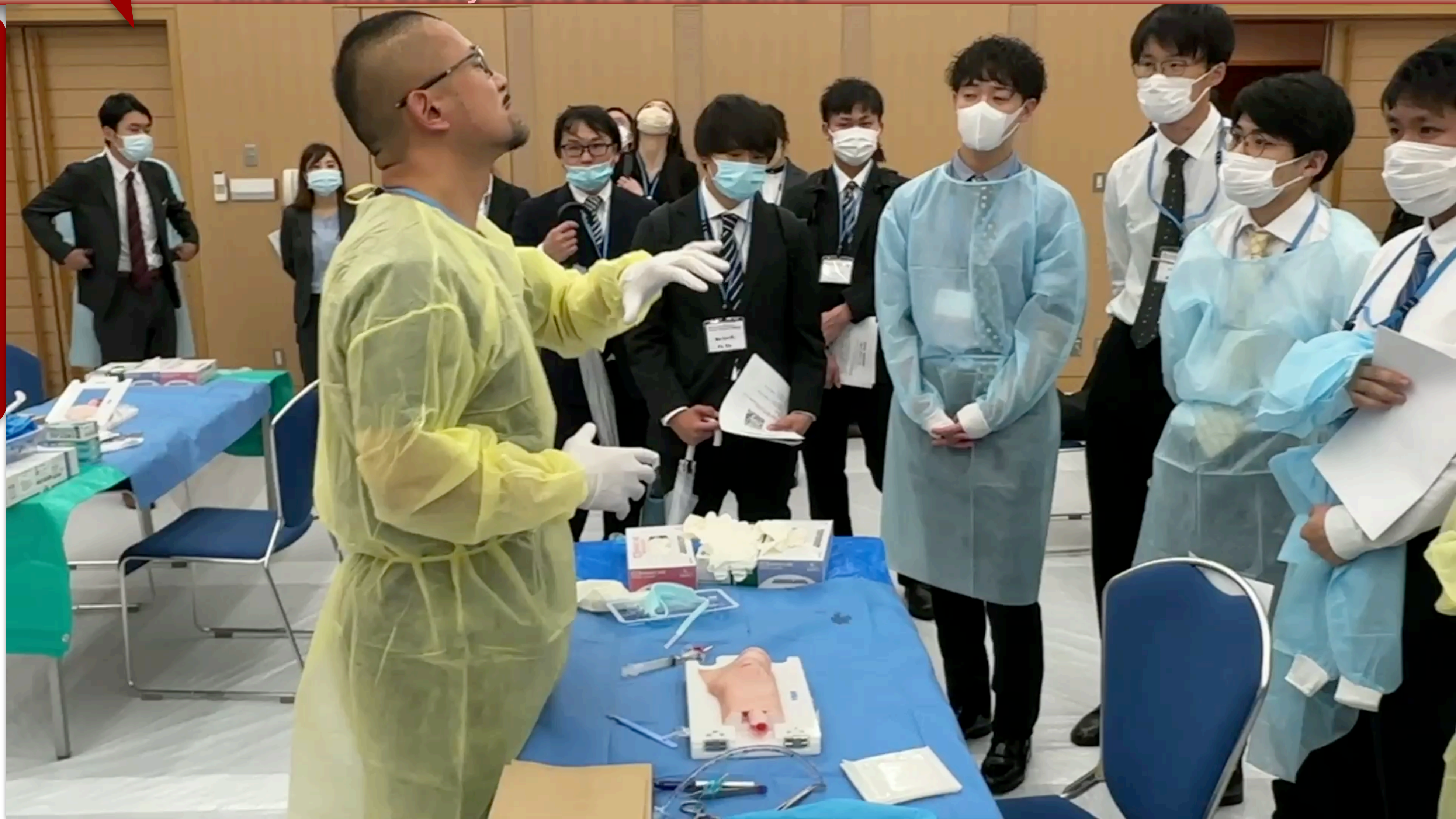
メスとペアンがあったら
それは最強！



東京慈恵会医科大学
大村和弘先生

最強！メスとペアン

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最強！メスとペアン

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輪状甲状間膜切開：メスとペアンと挿管チューブ

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メスとペアンと挿管チューブ
だったら
無敵！



東京慈恵会医科大学
大村和弘先生

無敵！メスとペアンと挿管チューブ

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輪状甲状間膜穿刺:キット そのつぎにはやい

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市販キットのなかで
ほぼ最速
クイックトラック



輪状甲状靱帯穿刺切開キット クイックトラック

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手順が少なくて
とにかく速い!
小児用 大人用 あり



キット:クイックトラック

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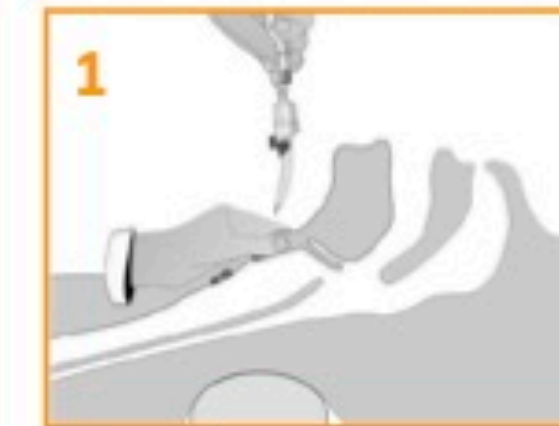
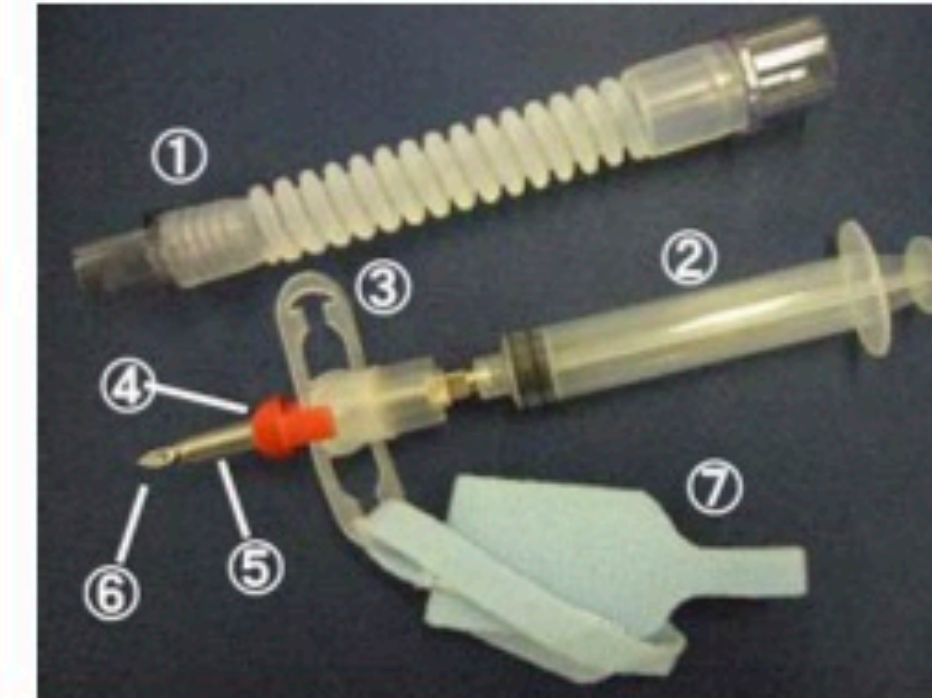
クイックトラック

smiths medical
bringing technology to life

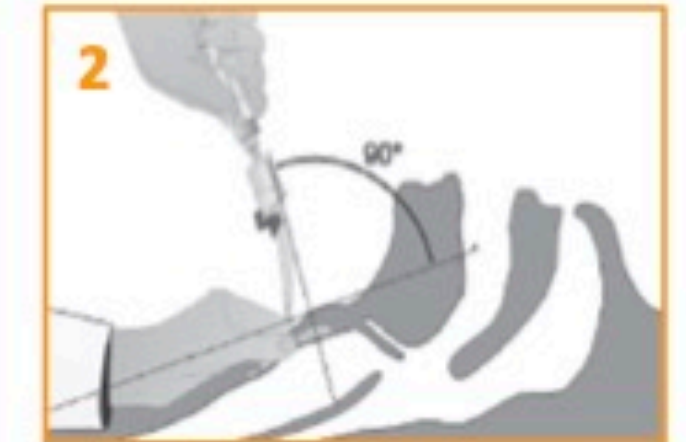
品番: 30-04-004-1 (成人用) / 30-04-002-1 (小児用)

【各パーツの名称】

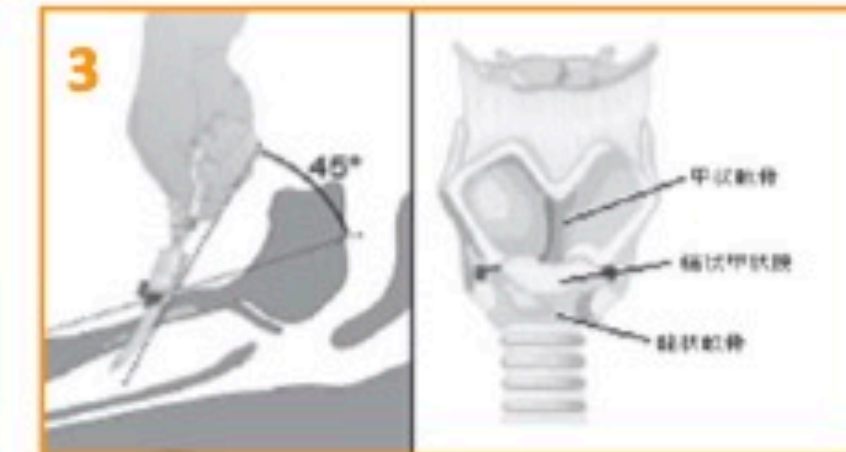
- | | |
|------------|----------|
| ①カテーテルマウント | ⑤気管カニューレ |
| ②シリンジ | ⑥ニードル |
| ③フランジ | ⑦ネックテープ |
| ④ストッパ | |



患者の頸部を伸展させます。輪状軟骨と甲状軟骨の凹部を触診して輪状甲状間膜の位置を確認します。人差し指と親指で穿刺目的部位をしっかりと保持します。クイックトラックは開封するとすぐに使用できるようになっています。クイックトラックの内針の先端孔及びストッパを患者の尾側方向に向くように、シリンジを保持します。



シリンジとカニューレをセットした状態で、ニードルを輪状甲状膜に垂直に穿刺します。肥満等で術野付近の皮下組織が厚くシリンジで吸引できない場合は、ストッパを取り外して空気を吸引できるまで慎重にニードルと共に気管カニューレを押し進めます。



45°に傾けストッパが頸部表面に接する位置までニードルを更に気管内に進めます。ストッパは気管の深くまでニードルを穿刺してしまうことを防ぐ目的でセットされているので、ニードルによる気管後壁穿孔のリスクを軽減できます。シリンジに陰圧をかけ気管内の空気を吸引できることを確認し、ニードルが気管内に正しく到達していることを確認します。ストッパを取り外します。



気管カニューレのフランジが頸部表面にくるまでニードルに沿って気管カニューレを気管内に進めます（ニードルをそれ以上深く進めないでください）。気管カニューレを留置できたらシリンジとニードルをいっしょに引き抜きます。
※気管内に気管カニューレが到達したのを確認する前に内針とシリンジを引き抜かないで下さい。



付属のネックテープで気管カニューレを固定します。付属のカテーテルマウントを気管カニューレの15mmコネクタに接続し、もう一方を蘇生用バッグなどに接続して換気を行います。

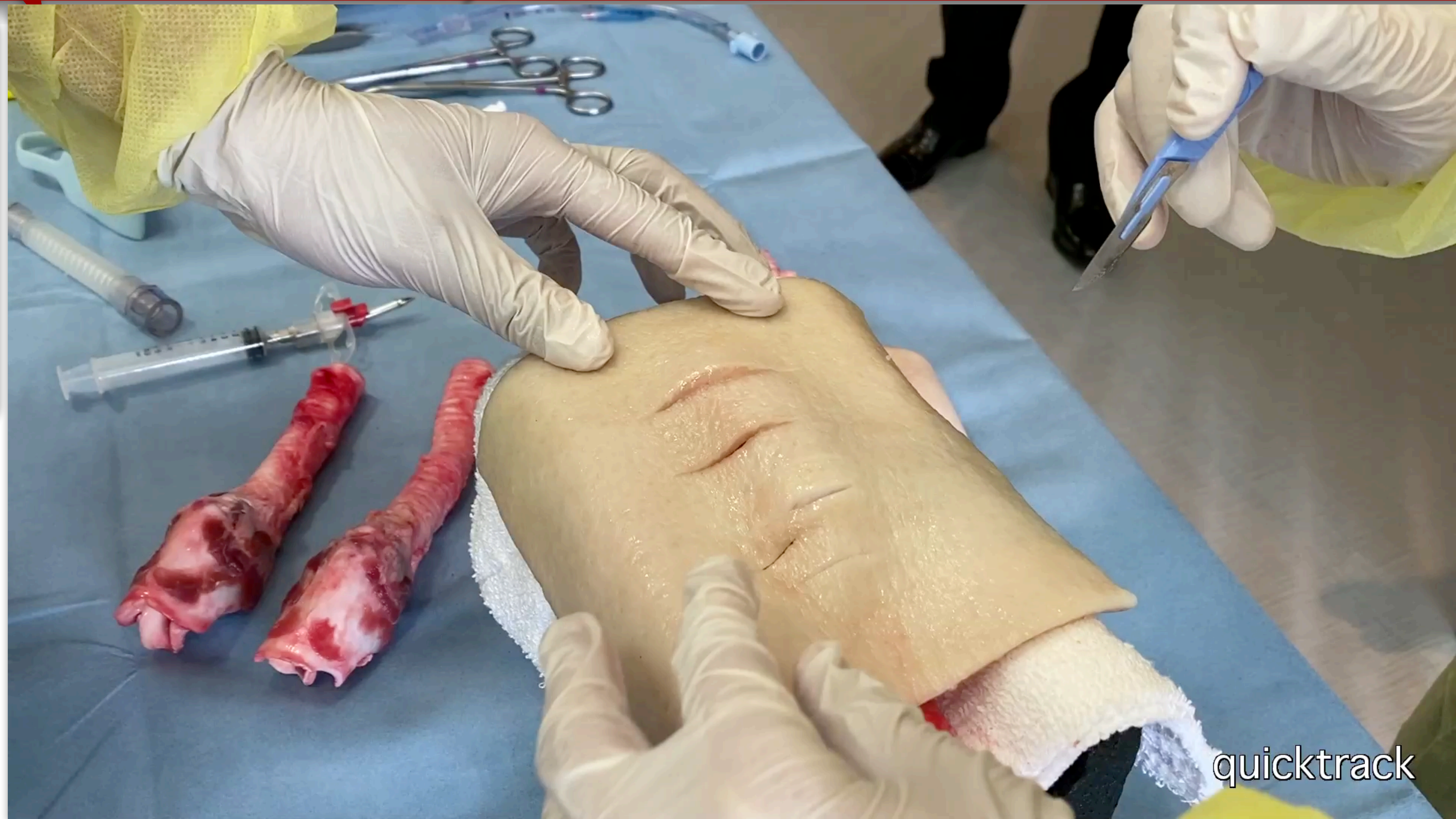
手順が少なくて
とにかく速い!
小児用 大人用 あり



東京医科大学
本橋玲先生

キット:クイックトラック

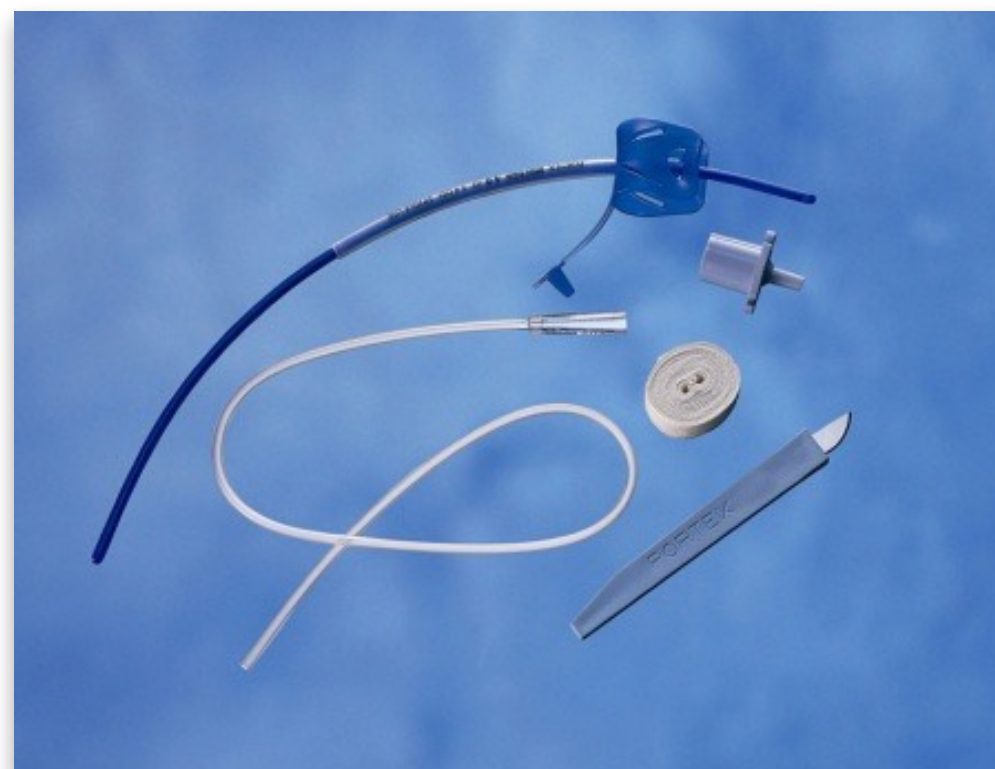
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ミニトラック vs クイックトラック

Nihon University School of

準備も含めてのトータル時間
ミニトラック 149.7sec
クイックトラック 47.9sec
クイックトラックのほうが速い!
Fikkers 2004



Anaesthesia, 2004, 59, pages 1008–1011

APPARATUS

Emergency cricothyrotomy: a randomised crossover trial comparing the wire-guided and catheter-over-needle techniques

B. G. Fikkers,¹ S. van Vugt,² J. G. van der Hoeven,³ F. J. A. van den Hoogen⁴ and H. A. M. Marres⁴

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Summary

In a randomised crossover trial, we compared a wire-guided cricothyrotomy technique (Minitrach) with a catheter-over-needle technique (Quicktrach). Performance time, ease of method, accuracy in placement and complication rate were compared. Ten anaesthesiology and 10 ENT residents performed cricothyrotomies with both techniques on prepared pig larynxes. The catheter-over-needle technique was faster than the wire-guided (48 compared to 150 s, $p < 0.001$) and subjectively easier to perform (VAS-score 2.1 vs. 5.6, $p < 0.001$). Correct positioning of the cannula could be achieved in 95% and 85%, respectively (NS). There was one complication in the catheter-over-needle group compared to five in the wire-guided group. We conclude that the wire-guided minitracheotomy kit is unsuitable for emergency cricothyrotomies performed by inexperienced practitioners. On the other hand, the catheter-over-needle technique appears to be quick, safe and reliable.

Keywords *Manikins. Airway obstruction. Tracheotomy.*

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Cricothyrotomy is a surgical intervention intended to gain control of the airway that cannot otherwise be accessed in an emergency situation [1, 2]. It is therefore the final step in the difficult-airway algorithm of the ASA (American Society of Anesthesiologists) [3]. If performed correctly, it is a quick and essential life-saving skill. However, most physicians involved in airway management have only very limited experience with this technique, since it is rarely used and, if used, it is nearly always in a crisis situation. Recent studies do not demonstrate a significant difference in procedure time and complication rates between the conventional (surgical) approach and the techniques that make use of the Seldinger method [4, 5]. Catheter-over-needle cricothyrotomy seems to be a fast procedure and easy to perform [6, 7]. This study evaluated and compared the procedure

time, reliability and peri-operative complications of two techniques frequently used for emergency cricothyrotomy – the wire-guided (Minitrach) and the catheter-over-needle (Quicktrach) procedures [7–9].

Methods

In this randomised crossover trial, residents from the University Medical Centre Nijmegen performed cricothyrotomies using both the wire-guided and catheter-over-needle techniques. Larynxes from freshly slaughtered pigs were collected. Each larynx was freed of prelaryngeal tissues and covered with a piece of thinned pigskin, stapled to a wooden board and positioned with the cricothyroid membrane facing upwards (Fig. 1). The cranial side of the airway was marked. We simulated an emergency setting in

輪状甲状靱帯穿刺切開キット ミニトラック2

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セルジンガー法
使いやすくとってもよいキット
だったのですが...



東京医科大学
本橋玲先生

穿刺切開キット ミニトラック2

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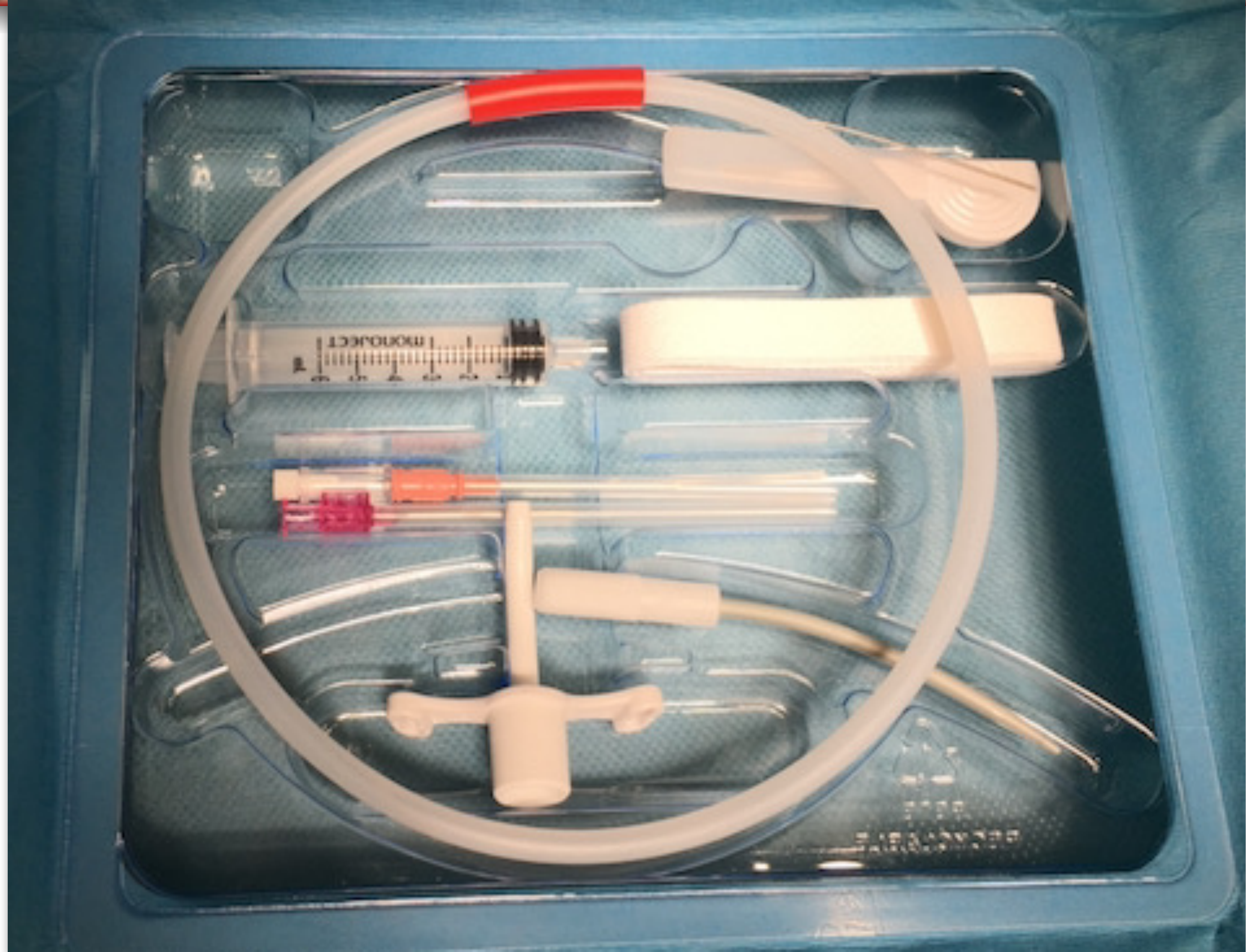
seldinger_mini-track2



輪状甲状靱帯穿刺切開キット メルカー

Nihon University School of Medicine

セルジンガー法
使いやすい



輪状甲状靱帯穿刺切開キット メルカー

セルジンガー法
使いやすい

MELKER 緊急用輪状甲状膜切開用カテーテルセット

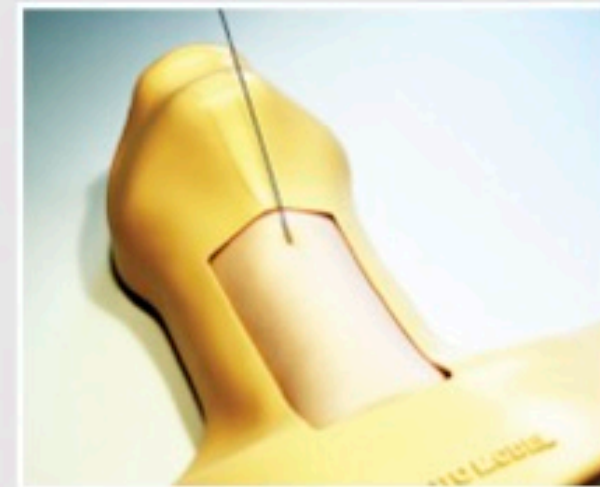
Melker 緊急用輪状甲状膜切開用カテーテルセットは、気管チューブの挿入ができない場合などの緊急気道確保に使用します。*



Step 1: 輪状甲状膜の位置を確認します。



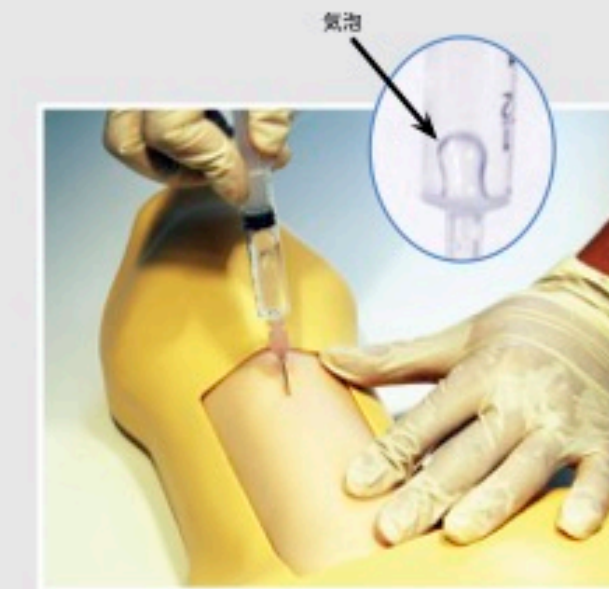
Step 2: 尖刀（スカルペル）を用いて、輪状甲状膜をダイレータと気道チューブ（輪状甲状膜切開用カテーテル）が挿入しやすいよう正中線に沿って、縦に1～2cm切開します。



Step 5: ガイドワイヤを気管内に挿入後、外套または一針型穿刺針を抜去します。



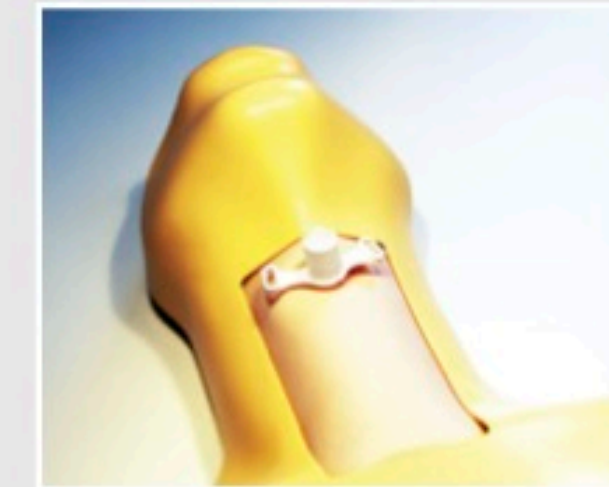
Step 6: ガイドワイヤの硬い手元側がダイレータのハンドルから現れるまで、ガイドワイヤに沿って、ダイレータと気道チューブ（輪状甲状膜切開用カテーテル）を一体にして進めます。



Step 3: カテーテルセットに同梱の穿刺針のいずれかを6ccシリンジに取り付け、正中線上、前頭面に対して尾側方向に45°の角度で経皮穿刺します。吸引後、気泡の発生により、位置が適切であることを確認します。



Step 4: 気管に到達したらシリンジを抜去します。次に、ガイドワイヤの柔軟な先端部分を一針型穿刺針または二針型穿刺針の外套に挿入します。



Step 7: ダイレータと気道チューブ（輪状甲状膜切開用カテーテル）を一体にして気管内に完全に挿入し、ダイレータとガイドワイヤを抜去します。



Step 8: 標準的なアダプタを用いて、緊急用気道カテーテルを適切な換気デバイスに接続します。

* 使用方法、警告、禁忌・禁止、使用上の注意等の詳細は添付文書を参照してください。

輪状甲状靱帯穿刺切開キット メルカー

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メルカーの動画がまにあわずに申し訳ありません
ミニトラックとだいたいいいですよ



トレーニングは重要

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模型で10回練習したら
40秒以内に,全員が
輪状甲状間膜穿刺切開術できるようになった
David 2003



What Is the Minimum Training Required for Successful Cricothyroidotomy?

A Study in Mannequins

David T. Wong, M.D.,* Atul J. Prabhu, F.R.C.A.,† Margarita Coloma, M.D.,‡ Ngozi Imasogie, F.R.C.A.,† Frances F. Chung, F.R.C.P.C.§

Background: A correctly performed cricothyroidotomy may be lifesaving in a cannot-ventilate, cannot-intubate situation. However, many practicing anesthesiologists do not have experience with cricothyroidotomy. The purpose of this study was to determine the minimum training required to perform cricothyroidotomy in 40 s or less in mannequins.

Methods: After informed consent, participants were shown a demonstration video and asked to perform 10 consecutive cricothyroidotomy procedures on a mannequin using a preassembled percutaneous dilational cricothyroidotomy set. Each attempt was timed from skin palpation to lung insufflation. Cricothyroidotomy was considered successful if it was performed in 40 s or less, and the cricothyroidotomy time was considered to have plateaued when there were no significant reductions in cricothyroidotomy times in three consecutive attempts.

Results: One hundred two anesthesiologists participated in the study. There was a significant reduction of cricothyroidotomy times over the 10 attempts ($P < 0.0001$) and between three consecutive attempts until the fourth attempt ($P < 0.03$). The cricothyroidotomy times plateaued by the fourth attempt, while the success rate plateaued at the fifth attempt (94, 96, 96, and 96% at the fourth, fifth, sixth, and seventh attempts, respectively).

Conclusion: Practice on mannequins leads to reductions in cricothyroidotomy times and improvement in success rates. By the fifth attempt, 96% of participants were able to successfully perform the cricothyroidotomy in 40 s or less. While clinical correlates are not known, the authors recommend that providers of emergency airway management be trained on mannequins for at least five attempts or until their cricothyroidotomy time is 40 s or less. The most appropriate retraining intervals have yet to be determined for optimal cricothyroidotomy skill retention.

CORRECTLY performed cricothyroidotomy may be lifesaving in a cannot-ventilate, cannot-intubate situation.¹ However, emergent cricothyroidotomy is performed infrequently and can be difficult because of the lack of training and skill retention.^{2,3} Thus, many physicians

might not possess the necessary skills to perform a cricothyroidotomy correctly or expediently.

Recent advancement in residency training programs and improvements in airway management of patients with potential spine injuries have resulted in a decrease in the number of emergency cricothyroidotomy.^{4,5} Given the rarity of this procedure, it is likely that many anesthesiologists will not acquire clinical experience with this technique during training⁵ or may no longer have the skills to perform this procedure.² In light of this situation, many different techniques of cricothyroidotomy have been developed to simplify the procedure and increase retention.^{2,6,7}

During the past 15 yr, there has been increasing interest in newer technologies to enhance the education and training of medical personnel.^{8,9} However, individual and institutional learning process are complex and depend on a variety of factors, such as institutional preferences, the learning and teaching situation, and the number of cases over time.¹⁰⁻¹² To develop a rational training program for a new procedure, the necessary number of cases per procedure should be determined to achieve an optimal rate of success.¹⁰⁻¹² Few studies have investigated this topic in anesthesia. To date, no prospective study has established the minimum number of cricothyroidotomies required to be performed to acquire enough skills to achieve them in 40 s or less.

The purpose of this study was to determine the minimum number of training cricothyroidotomy attempts required to perform the procedure in 40 s or less in mannequins and also to determine the effect of training on cricothyroidotomy success rate and cricothyroidotomy times.

Materials and Methods

The study was approved by the University Health Network Research Ethics Board (University of Toronto, Toronto, Ontario, Canada). Written informed consent was obtained from participants. They included staff anesthesiologists, fellows, and residents from the Department of Anesthesiology, University of Toronto. The participants' ages, years of practice, and previous cricothyroidotomy experience were recorded.

The participants were shown the steps of the procedure in a 3-min demonstration video (Cook Inc., Bloomington, IN) on the Seldinger technique cricothyrotomy

This article is featured in "This Month in Anesthesiology." Please see this issue of ANESTHESIOLOGY, page 5A.

* Assistant Professor, † Clinical Fellow, ‡ Clinical Research Fellow, § Professor.

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輪状甲状靱帯穿刺・切開術の合併症

Nihon University School of Medicine

不適切な部位への誤挿入 切開部位の誤り

出血 血腫

皮下気腫 縦隔気腫

喉頭損傷 喉頭狭窄 喉頭浮腫

発声障害 嚥声

合併症

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合併症率 6.1%
Kness 1982



METHODS AND TECHNIQUES
airway management, cricothyroidotomy; cricothyroidotomy

Cricothyroidotomy

Cricothyroidotomy is discussed within the overall spectrum of airway management. The history and recent research on the subject are reviewed, supporting cricothyroidotomy as the airway of choice in selected emergency and elective situations. Indications, technique, including special comments on the pediatric patient, contraindications, and complications are described. [Kress TD, Balasubramaniam S: Cricothyroidotomy. Ann Emerg Med 11:197-201, April 1982.]

Thomas D. Kress, MD
S. Balasubramaniam, MD, FRCS
Los Angeles, California

From the Department of Emergency
Medicine, Charles R. Drew Postgraduate
Medical School, Los Angeles, California.

INTRODUCTION

Establishment of the airway, the foremost priority in the resuscitation of the critically injured patient, spans a broad range of techniques. Maneuvers including head tilt, neck lift, jaw thrust, chin lift, back slaps, abdominal and thoracic thrusts, foreign body removal by finger sweep or forceps, supplemental oxygen via mouth to mouth, mouth to mask, nasal cannula, bag valve mask, elder valve, venturi, jet insufflation, and esophageal obturator® and esophageal gastric airways are all potential modalities for optimizing the patient's ventilation. For the patient in acute respiratory distress, the direct intubation of the trachea becomes mandatory for control of the airway, including removal of secretions and mechanical ventilation. In general this can be accomplished by oral or nasotracheal intubation. There are certain settings, however, such as cervical spine injuries, in which these usual endotracheal intubation techniques either are not possible or are contraindicated. Research done in recent years makes a convincing case for cricothyroidotomy as the airway of choice in these situations.¹⁻⁵

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Angeles, California 90059.

Presented at the Third Annual Trauma
Seminar, sponsored by the Charles R.
Drew Postgraduate Medical School, the
Los Angeles County Medical Association,
and the Trauma Section of the American
College of Surgeons, Anaheim, California,
May 1981.

HISTORY

Cricothyroidotomy, the establishment of an airway by puncture or incision through the membrane joining the thyroid and cricoid cartilage, may also be considered a laryngostomy because the cricothyroid membrane falls within the anatomical larynx. For many years, the procedure was condemned as leading almost inevitably to complications, most significantly subglottic stenosis. Chevalier Jackson, one of the revered fathers of early 20th century medicine, led this condemnation in 1921 with his classic paper which severely criticized the procedure and generally kept it in ill repute for more than 50 years.^{6,7}

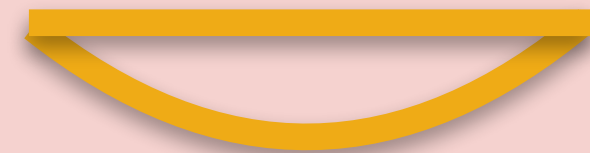
However, various studies in the past decade, most notably those of Brantigan and Grow² but also those of Boyd,³ Habel,⁴ and Sise and Shackford,² have greatly changed the thinking on this safe, simple, and quick procedure.

Brantigan and Grow, from the University of Colorado, reported on 655 patients undergoing cricothyroidotomy in the operating room (73%) and at the bedside (27%). The age range was 8 months to 93 years, and the average duration of intubation was seven days. Their very limited complications (6.1%) are noted (Table). Most significant is the complete absence of subglottic stenosis and the favorable comparison with complication rates in the most frequently quoted tracheotomy studies (ie, from 19% to 66%).^{1,2}

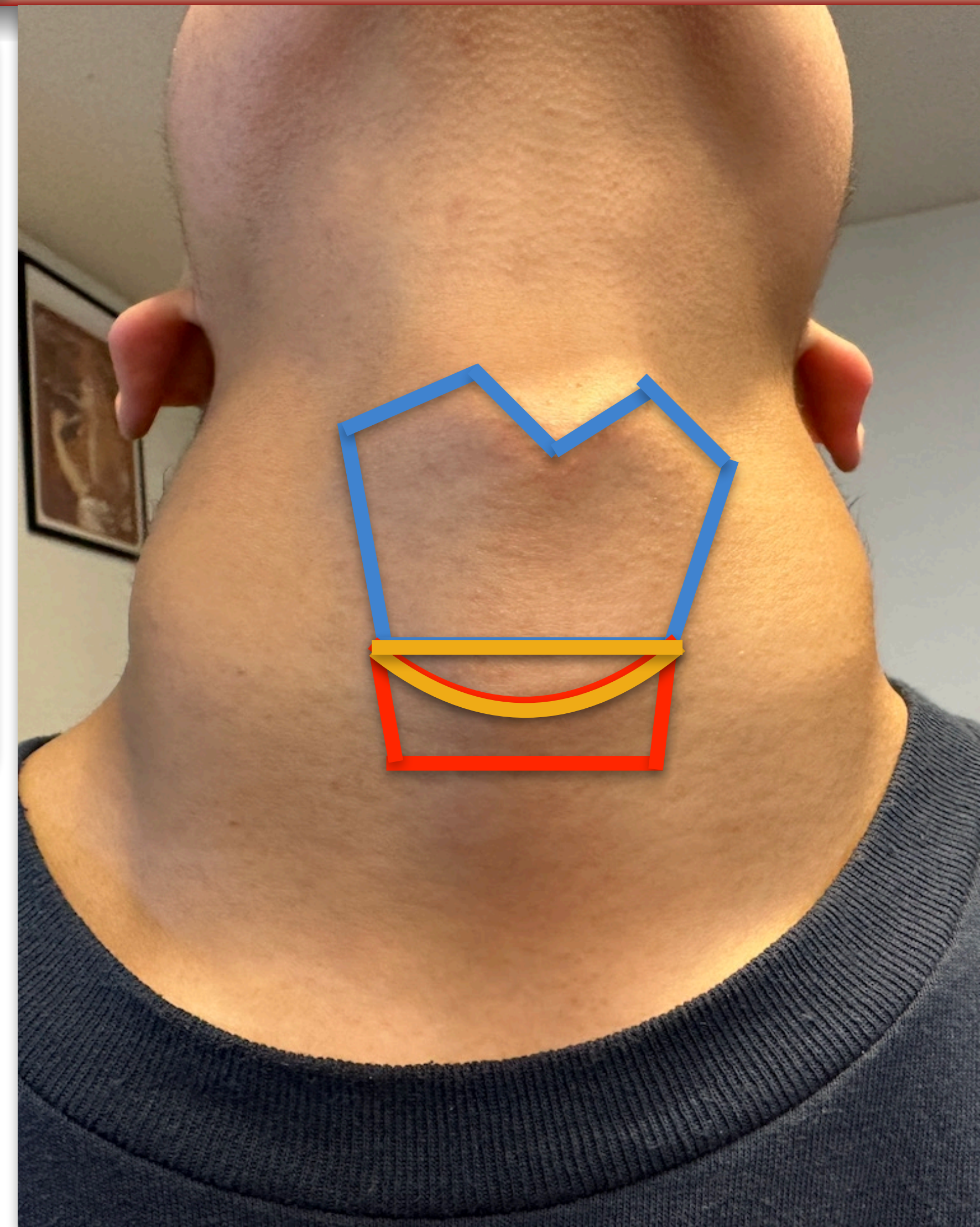
Boyd et al³ reported similar results of cricothyroidotomies performed on 147 patients at New York University Medical Center and Booth Memorial Medical Center with a complication rate of 6.8%. Thirty-five of the patients

合併症がないように正しい位置に穿刺しよう

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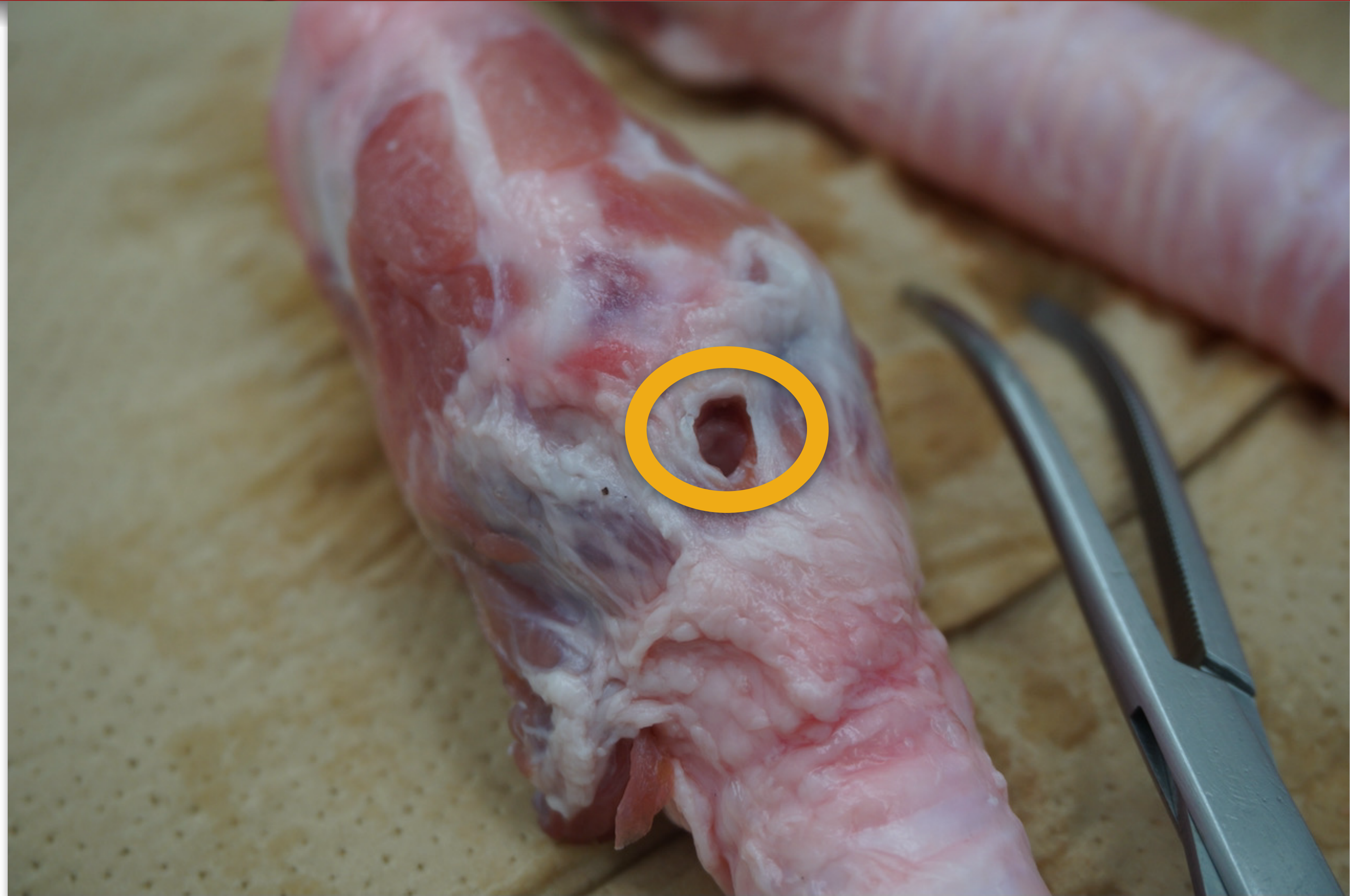
正しい
輪状甲状間膜！



合併症がないように正しい位置に穿刺しよう

Nihon University School of Medicine

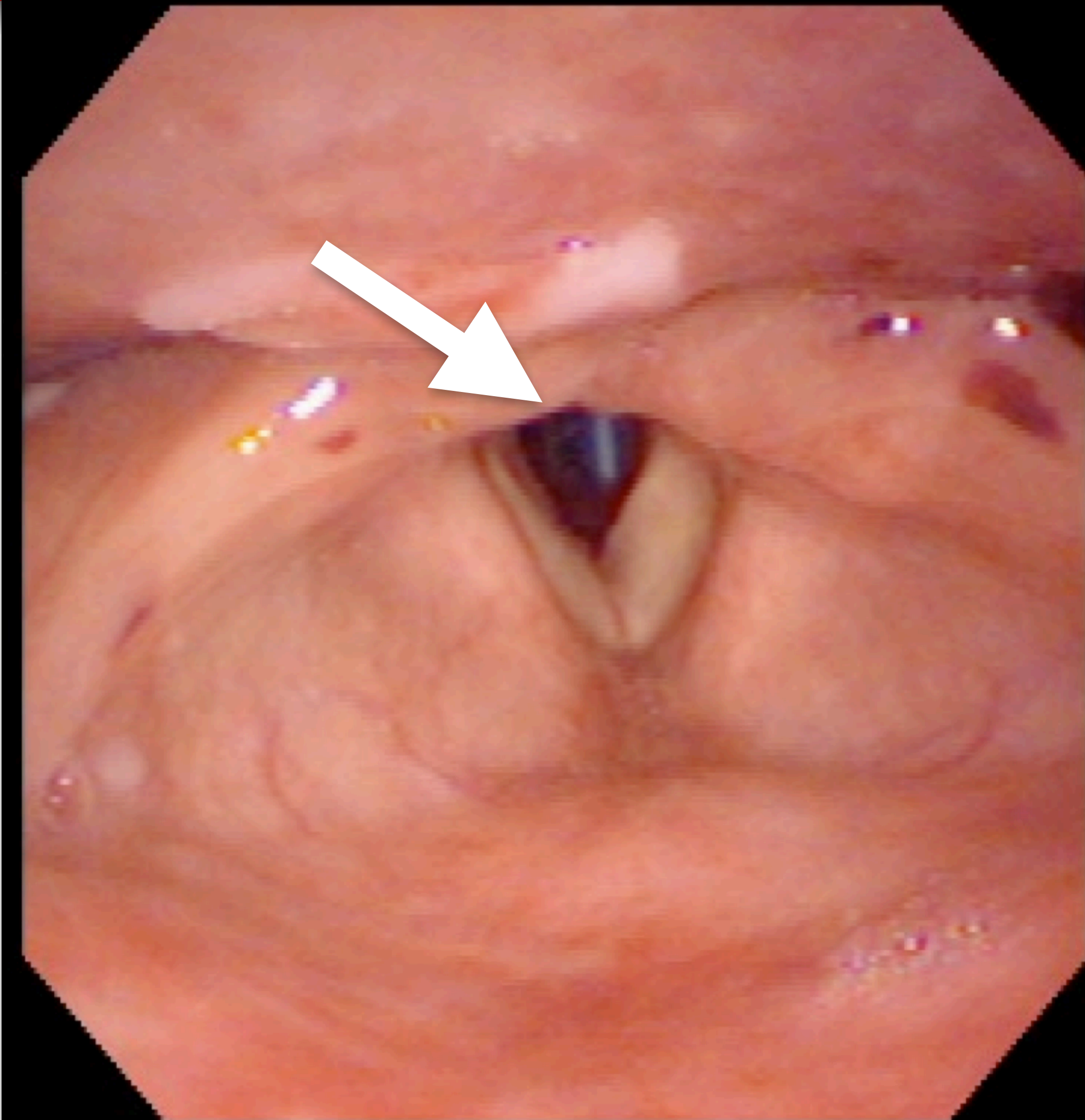
正しい
輪状甲状間膜！



合併症がないように正しい位置に穿刺しよう

Nihon University School of Medicine

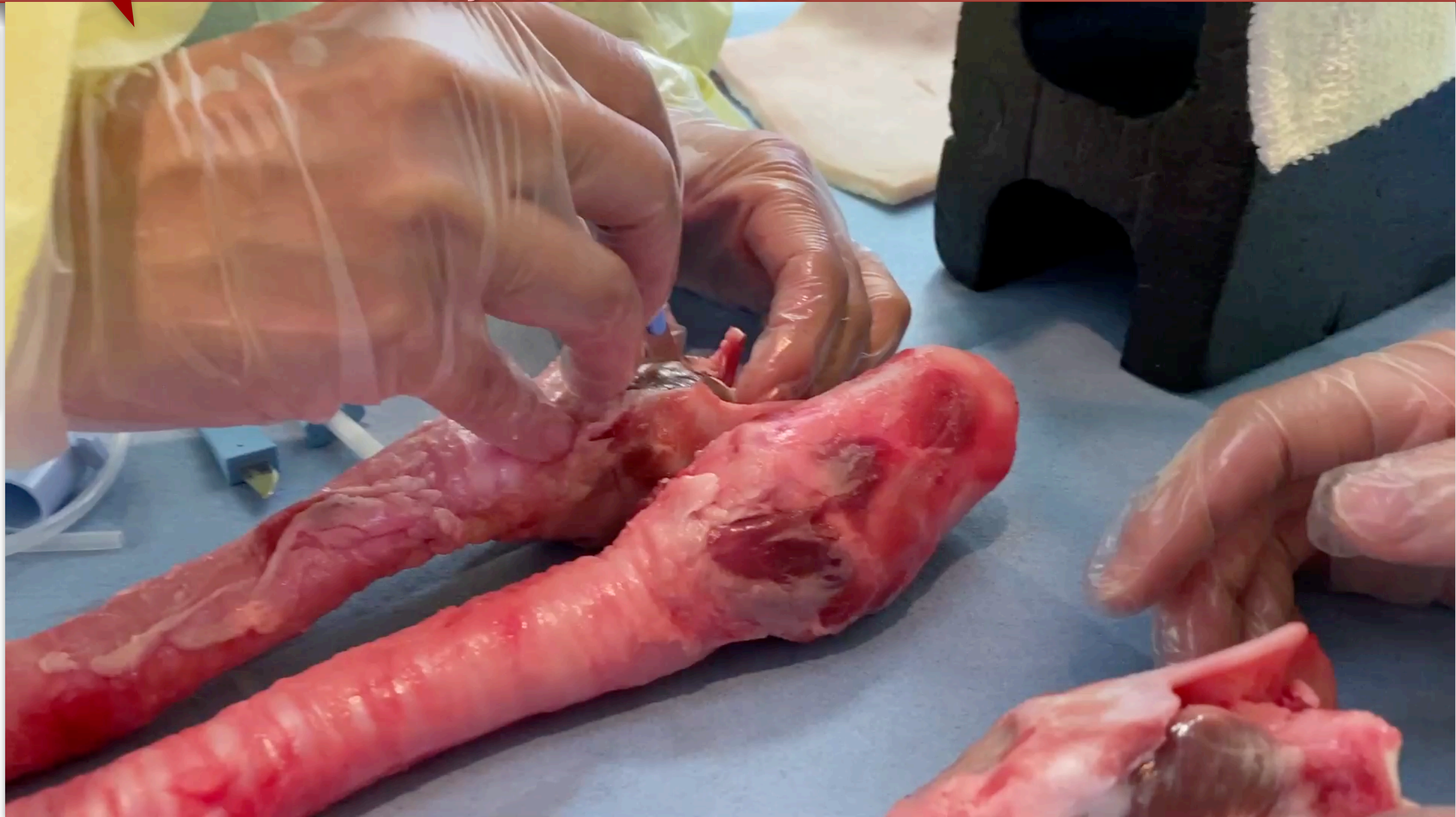
正しい位置は声門下で
声帯にかかることなく
声が悪くなることはない



東北大学
平野愛先生

嗄声？喉頭を背開きでみると？

Nihon University School of Medicine



經皮的氣管切開術

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經皮的氣管切開術

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緊急禁忌！

待期的內視鏡下氣管切開術！



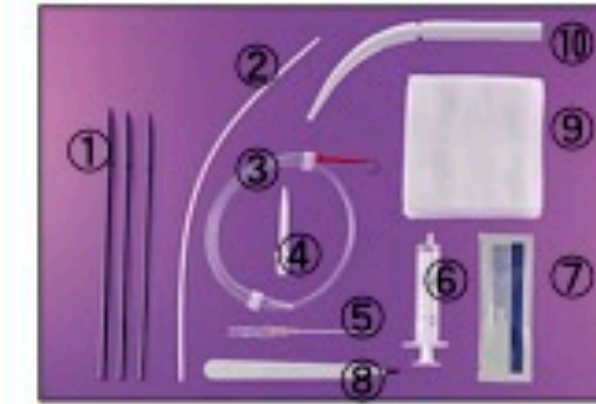
経皮的気管切開術

Nihon University School of Medicine

緊急禁忌
内視鏡下 挿管管理下
に施行



ウルトラパーク



品番:100/562/000

【各パーツの名称】

- | | |
|-----------------------|-------------|
| ①イントロデューサ | ⑤シリンジ(10ml) |
| ②ガイディングカテーテル | ⑦潤滑ゼリー |
| ③ガイドワイヤ | ⑧スカルペル |
| ④ショートダイレータ | ⑨ガーゼ |
| ⑤留置カニューレ付
14G静脈留置針 | ⑩ロングダイレータ |

ソフトシールカフ付サクションエイド
(別売)



品番:100/515/***



患者を仰臥位にして、患者の頸部を伸展し、首と肩の下に枕を置き安定させます。



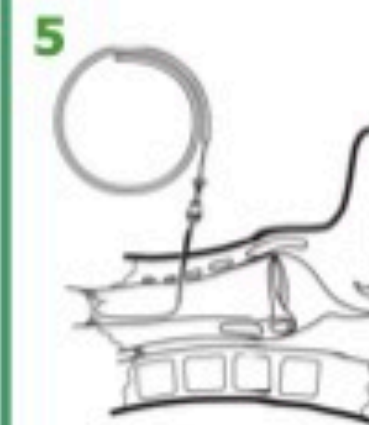
解剖学的ランドマークに印をつけます。FiO₂を100%まで上昇させ、患者の状態をモニタします。喉頭部及び気管内を吸引後、気管内チューブのカフを脱気し、カフが声門直下の位置に来るまで引き上げ、再度インフレーションします。



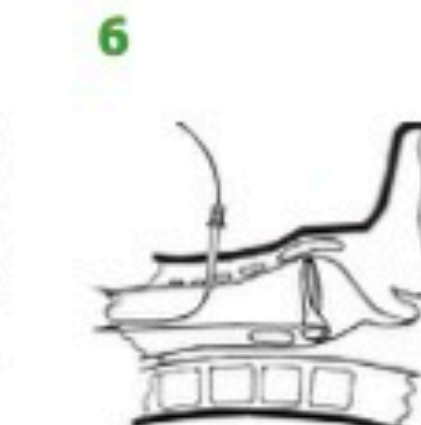
消毒とドレーピングを行った後、輪状軟骨の位置を触診により確認し、局所麻酔を浸潤させます。切開部位に1.5~2.0cm程度の横又は縦方向の皮膚切開を行います。



留置カニューレ付14G静脈留置針に滅菌生理食塩水を入れたシリンジを取り付け、尾側に向けて穿刺します。シリンジに陰圧をかけ、気管内に留置針が到達したことを確認し、留置カニューレを残して14G静脈留置針を引き抜きます。



ガイドワイヤを気管内に留置します。(ガイドワイヤの遠位端マークが皮膚の表面に位置するまで挿入します)ガイドワイヤが留置カニューレ内を自由に動くことを確認してから、ガイドワイヤを残して留置カニューレを抜き取ります。



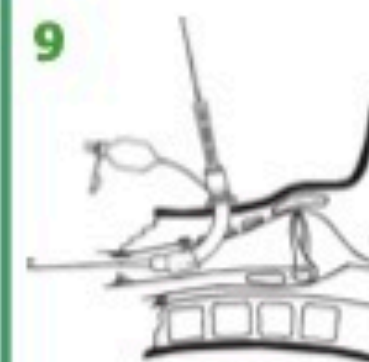
ガイドワイヤを介してショートダイレータを気管前壁まで進め、そっと回しながら気管壁を貫通させ、ショートダイレータを抜去します。



ガイドワイヤを介してセーフティストップが皮膚表面の位置に来るまでガイディングカテーテルを気管に挿入します。ガイディングカテーテルに表示された『→』の方向で挿入してください。ガイディングカテーテルの近位端とガイドワイヤの近位マークは、ガイディングカテーテル挿入深度の目安にすることができます。



ロングダイレータ導入直前に、ロングダイレータの遠位側(先端から最深挿入マークまで)を滅菌水又は滅菌生理食塩液に浸し、親水性コーティングに潤滑性をもたせます。ロングダイレータをガイディングカテーテルのセーフティストップの位置まで進めます。(ガイディングカテーテルの近位マークとロングダイレータの近位端がちょうど重なることで確認可能)ロングダイレータを気管内に挿入します。気管拡張後、ロングダイレータを抜去します。



＜ソフトシールカフ付サクションエイド使用の場合＞
ガイディングカテーテルを抜去し、ソフトシールカフ付サクションエイド気管切開チューブを、ガイドワイヤを介して挿管します。

＜ソフトシールカフ付サクションエイド以外を使用の場合＞
気管切開チューブをイントロデューサにセットし、ガイドワイヤ及びガイディングカテーテルを介して、気管切開チューブを挿管します。

smiths medical
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東京大学
上羽瑠美先生

経皮的気管切開術

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PDT

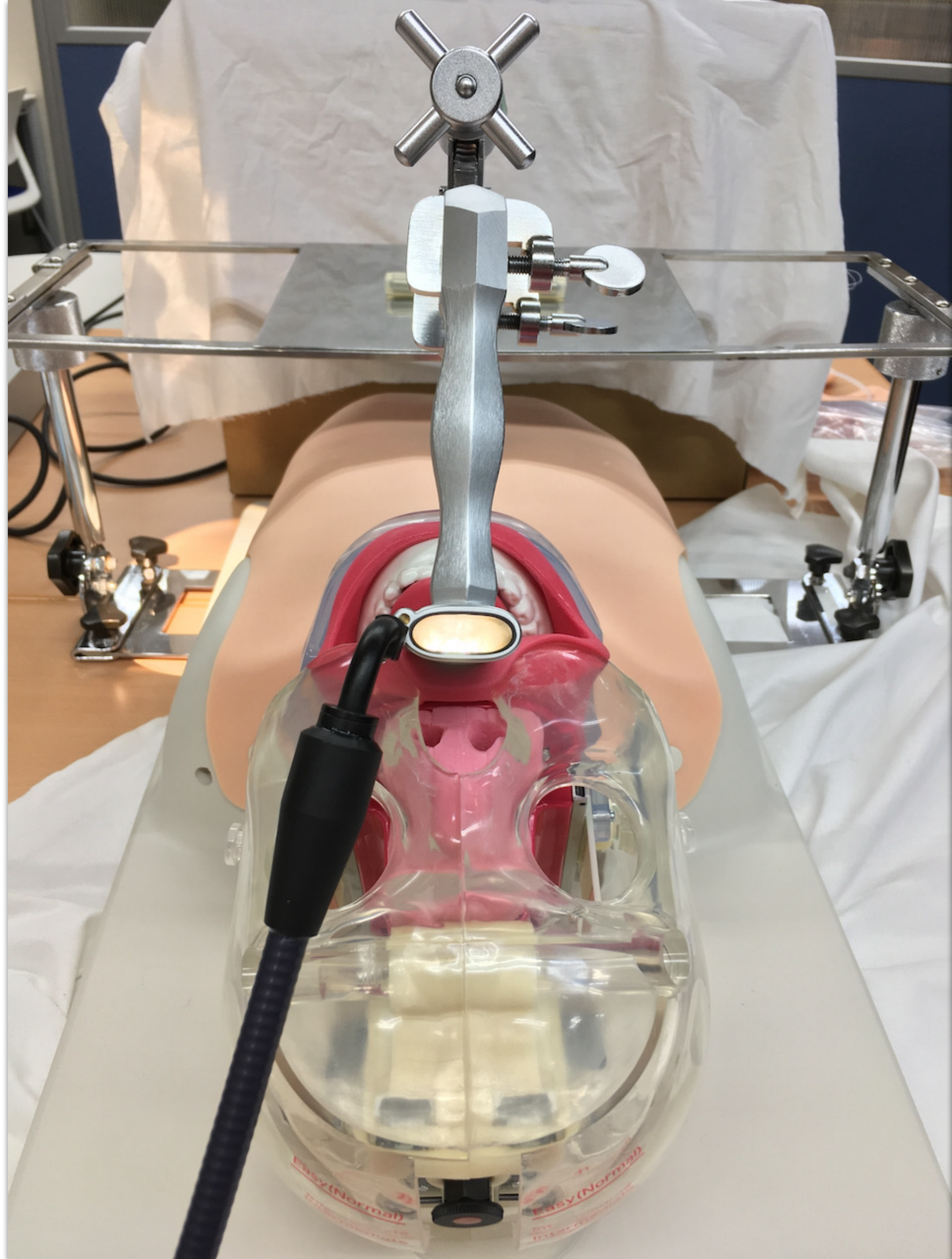


顕微鏡下喉頭微細手術 LMSハンズオン

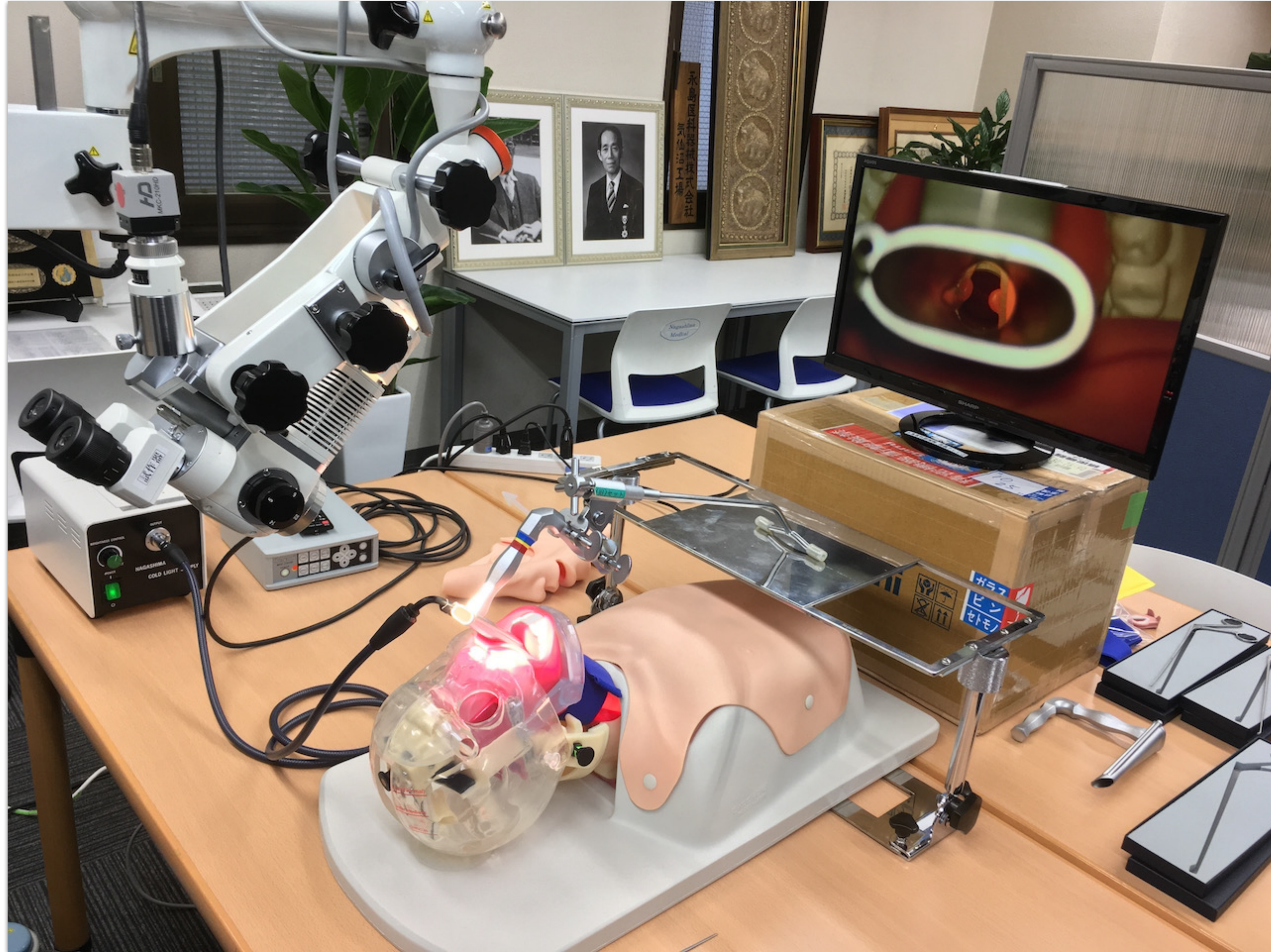
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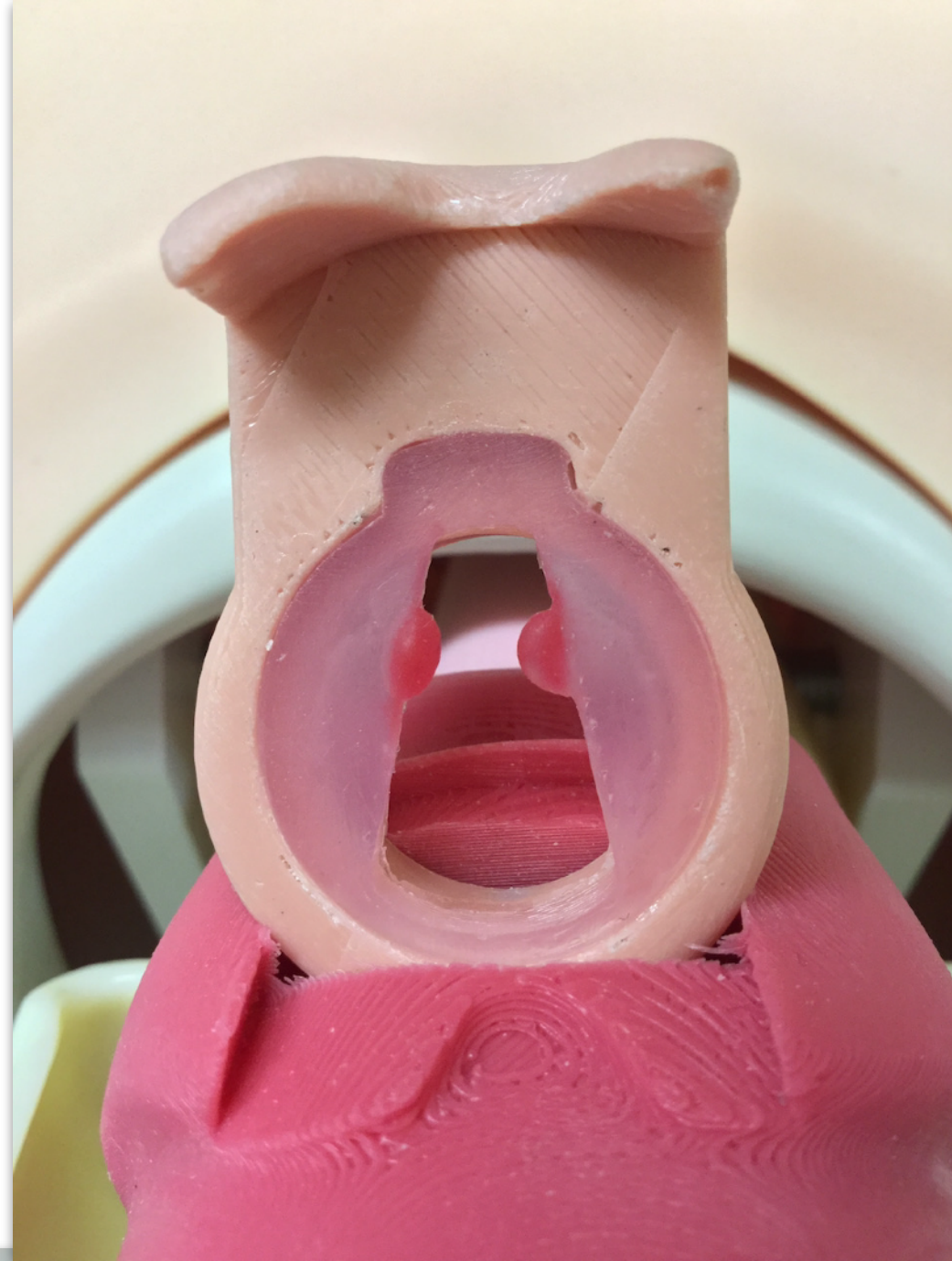
時間に余裕あったら
ぜひ,やってみてください!





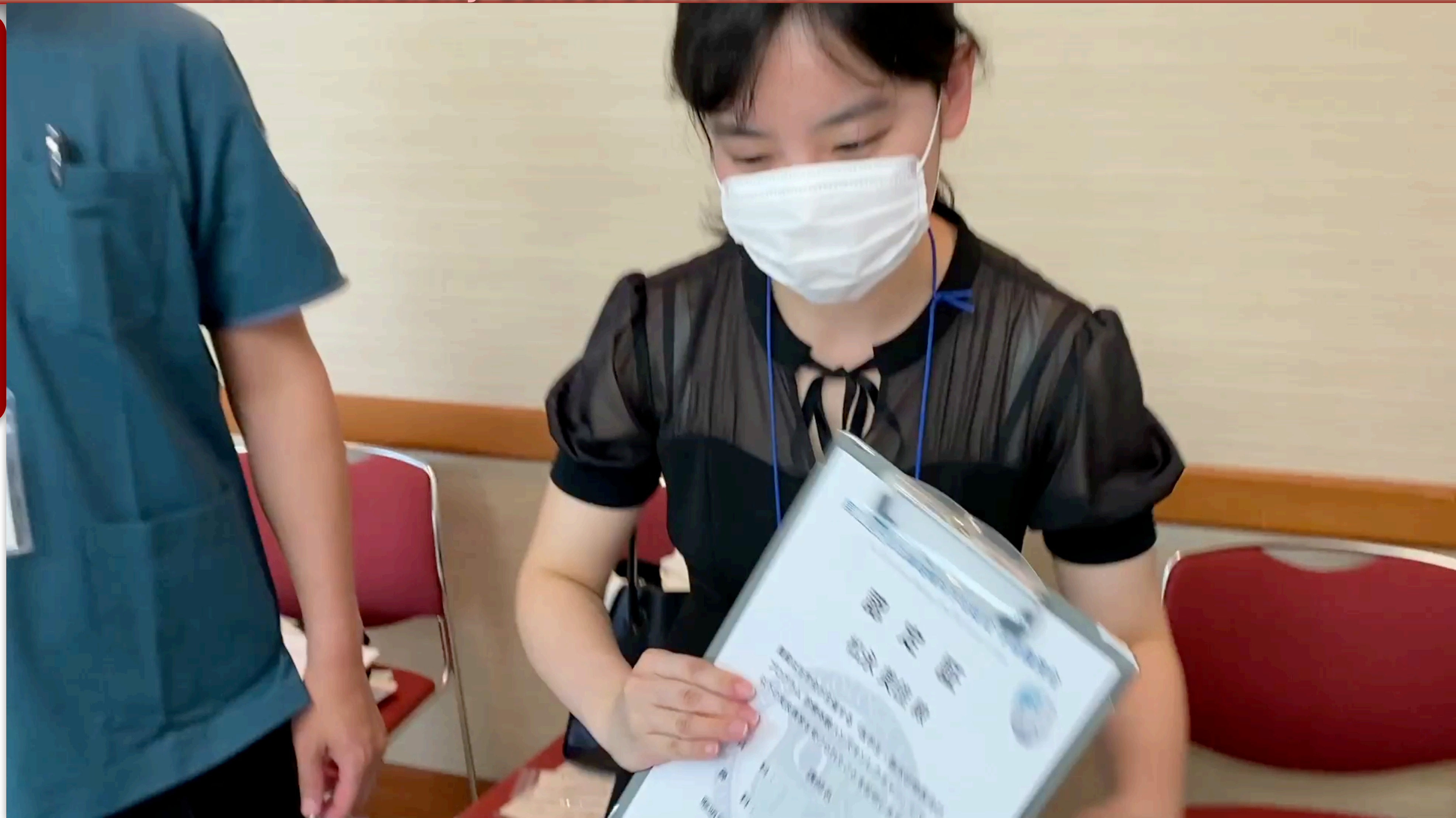






実習直後の感想: 初期研修医

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実習直後の感想: 初期研修医

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実習

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さあ,実習!

