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· 甲状腺外科专题研究 ·

无充气经锁骨下腔镜甲状腺右叶切除+右侧中央区清扫1例 视频报告

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摘要

背景与目的: 笔者团队经临床探索后从手术切口定位、手术路径及手术器械三方面对传统的锁骨下入路腔镜甲状腺手术进行了改进和创新, 故撰写本文, 以供同行参考。

方法: 结合手术视频, 汇报笔者团队实施的1例无充气经锁骨下腔镜甲状腺右叶切除+右侧中央区清扫手术资料, 并进行文献回顾与讨论。

结果: 手术在腔镜下顺利完成, 总手术时间65 min, 出血量约5 mL。术后恢复可, 术后2 d拔管出院, 总引流量100 mL, 术后住院2 d。

结论: 改良无充气经锁骨下入路腔镜甲状腺手术治疗甲状腺乳头状癌安全可行, 中央区清扫彻底, 切口隐蔽性好, 操作难度低, 有临床应用价值。

关键词

甲状腺癌, 乳头状; 甲状腺切除术; 内窥镜; 经锁骨下入路

中图分类号: R736.1

A video report of a case of gasless endoscopic right thyroid lobectomy with right central lymph node dissection by trans-subclavian approach

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Abstract

Background and Aims: After clinical exploration, our team has introduced improvements and innovations to the traditional trans-subclavian approach endoscopic thyroidectomy, focusing on surgical incision localization, surgical pathway, and surgical instruments. This article was written to serve as a reference for colleagues.

Methods: Utilizing surgical video footage, data of one case of gasless endoscopic right thyroid lobectomy with right central lymph node dissection by trans-subclavian approach performed by our team was presented, along with review of relevant literature and discussion.

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Results: The operation was successfully completed under endoscopy, with a total operative time of 65 min and an estimated blood loss of about 5 mL. Postoperative recovery was satisfactory, and the patient was discharged with tube removal on the 2nd postoperative day. The total drainage volume was 100 mL, and the postoperative hospital stay was 2 d.

Conclusion: The modified gasless trans-subclavian approach endoscopic thyroidectomy for treating papillary thyroid carcinoma is safe and feasible, with thorough central neck dissection, excellent incision concealment, and low operative difficulty. So, it has clinical application value.

Key words

Thyroid Cancer, Papillary; Thyroidectomy; Endoscopes; Trans-subclavian Approach

CLC number: R736.1

Shimizu 等^[1]在 1998 年首次报道经锁骨下入路腔镜甲状腺手术，国内也有少数单位开展^[2]，但文献报道的术式颈胸部皮瓣分离面积大、颈前区功能保留差。结合本团队前期开展腔镜甲状腺手术经验^[2-7]，经临床探索后从手术切口定位、手术路径及手术器械三方面对传统的锁骨下入路腔镜甲状腺手术进行了改进和创新^[8]，改良后的无充气经锁骨下入路腔镜甲状腺手术具有切口隐蔽、颈前区功能保护好、操作难度低及中央区清扫彻底性好等优势，已有多家单位开展相关术式。现整理本团队经锁骨下腔镜甲状腺右叶切除+右侧中央区清扫视频 1 例（视频 1）及患者情况、手术步骤、治疗结果报告如下，并结合文献资料加以讨论。



视频 1 无充气经锁骨下腔镜甲状腺右叶切除+右侧中央区清扫术

Video 1 Gasless endoscopic right thyroid lobectomy with right central lymph node dissection via trans-subclavian approach

扫描至移动设备观看手术视频:



<http://www.zpwz.net/zgptwkzz/article/html/pw230497>

1 临床资料与手术方法

1.1 一般资料

患者 女，25 岁，既往体健。1 个月余前在当地医院体检查甲状腺 B 超发现“甲状腺结节”，行细针穿刺检查提示“右甲状腺结节穿刺：见少许乳头状结构，不排除乳头状癌，建议 Braf 检测”，2023 年 5 月 17 日来浙江大学医学院附属邵逸夫医院就诊，查超声提示“甲状腺右叶结节，TBSRTC 5”（图 1）。结合患者超声及穿刺报告，甲状腺右叶结节诊断明确，甲状腺癌考虑，手术意愿明确。患者年轻，外观要求较高，沟通后于 2023 年 6 月 13 日行经锁骨下腔镜右侧甲状腺切除+右侧中央区清扫。入院后行血常规、血型、凝血功能、术前免疫、肝肾功能、电解质、甲状腺功能、甲状腺球蛋白、甲状腺球蛋白抗体、甲状腺过氧化物酶抗体、降钙素、心电图、胸部 CT 等检查未见明显手术禁忌。

1.2 手术方法

1.2.1 体位、手术室布局及切口定位 患者取仰卧位，垫肩，头稍后仰，偏向健侧。麻醉架固定于患者对侧腋窝顶端与肩部顶端中点部位以提供建腔悬吊。高清机组及显示器置于患者健侧，扶镜助手在患者头侧，主刀在患者足侧，器械台及洗手护士位于患者头侧（图 2）。在术前选定的操作侧锁骨下沿皮纹设计切口，长约 3~4 cm，切口上缘紧贴锁骨下缘，体表标记出胸锁乳突肌锁骨头前缘及胸骨头后缘（图 3）。

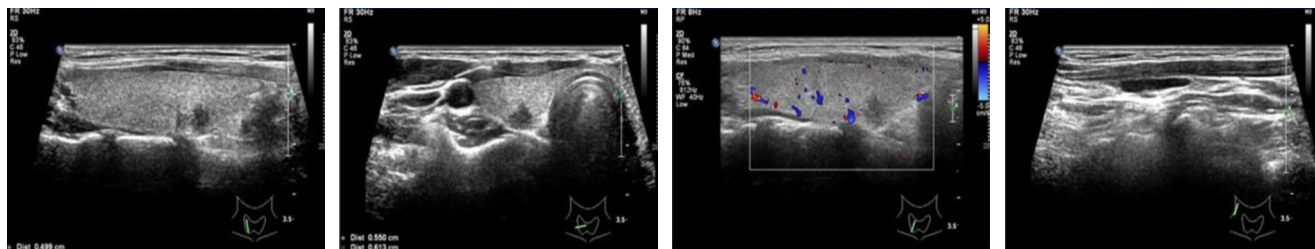


图 1 超声检查提示甲状腺右叶中下/背/中紧贴背侧可疑回声结节 (大小约 0.50 cm×0.55 cm×0.61 cm, TBSRTC 5)

Figure 1 The ultrasound examination showing a suspicious echogenic nodule in the lower/posterior/central aspect of the right thyroid lobe (approximately 0.50 cm × 0.55 cm × 0.61 cm in size, and classified as TBSRTC 5)

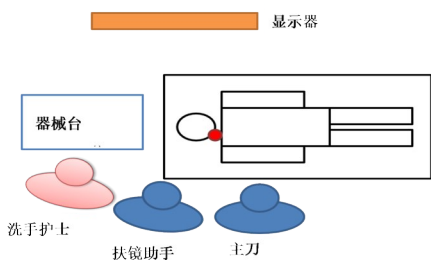


图 2 手术空间布局 (高清机组及显示器置于患者健侧, 扶镜助手在患者头侧, 主刀在患者足侧, 器械台及洗手护士位于患者头侧)

Figure 2 The surgical space layout (high-definition equipment and monitor positioned on the patient's healthy side, camera-holding assistant near the patient's head, primary surgeon on the patient's foot side, instrument table, and scrub nurse located near the patient's head)

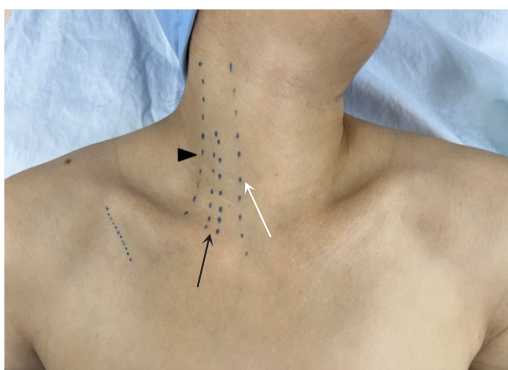


图 3 切口定位 (于锁骨下皮纹内做切口, 图中白色箭头所示为胸锁乳突肌前缘, 黑色三角所示为胸锁乳突肌后缘, 黑色箭头所示为胸骨头、锁骨头间隙)

Figure 3 Incision localization (incision made within the cleavage lines below the clavicle, as indicated by the white arrow representing the anterior border of the sternocleidomastoid muscle, the black triangle representing the posterior border of the sternocleidomastoid muscle, and the black arrow indicating the interval between the sternal head and clavicular head)

1.2.2 操作空间建立 于锁骨下皮纹内做切口, 切开皮肤及皮下组织, 紧贴颈阔肌深面向胸锁乳突肌方向分离, 沿途注意保护锁骨上神经, 显露胸锁乳突肌胸骨头、锁骨头间隙。置入自带负压吸引的特制悬吊拉钩 (图 4), 固定于麻醉架, 向上提吊皮瓣。内镜置于切口外上方, 超声刀、分离钳等操作器械由切口内下方置入。打开带状肌外缘, 稍分离后将悬吊拉钩置于带状肌下方, 将甲状腺整体向上牵拉。



图 4 特制悬吊拉钩 (钩体有 8 cm、10 cm、12 cm 三种长度, 图示为 10 cm 中长版本)

Figure 4 Specially designed suspension hooks (available in three lengths: 8 cm, 10 cm, and 12 cm, illustrated here is the 10 cm medium-length version)

1.2.3 喉返神经探查保护 于甲状腺下极水平分离, 神经监护下探查保护喉返神经^[9], 沿神经走行向上顺行解剖, 逐层打开甲状腺外侧纤维组织, 向上至入喉点水平。

1.2.4 上位甲状旁腺保护及入喉点处理 将悬吊拉钩调整到入喉点上方, 向上牵拉甲状腺腺体, 以盐水蘸湿的小纱条覆盖在喉返神经表面^[10], 减少热损伤风险, 超声刀逐步凝闭表面小血管, 向对侧牵翻腺体, 完成入喉点解剖。紧贴腺体表面继续向上分离, 解剖保护上位甲状旁腺。

1.2.5 喉上神经探查及上极操作 沿甲状腺外缘继续向上分离，向下方牵拉上极，紧贴腺体凝闭血管。以刺激电流 1.0~2.0 mA 在神经监测下探查保护喉上神经外支^[11-12]。离断甲状腺上极后向外下方牵拉腺体，于两侧环甲肌与带状肌之间清扫喉前区，注意避免损伤环甲肌。

1.2.6 下极处理及气管显露 于甲状腺下极水平向下解剖并保护喉返神经，至头臂干水平后向对侧解剖，显露气管，至气管对侧缘，自下而上离断标本，在气管表面操作时注意适当偏转超声刀刀头，避免热损伤^[13]。期间注意保护下位甲状旁腺，如术中检视发现甲状旁腺血供较差，需及时予自体移植^[14]。

1.2.7 VIb 区清扫 探查喉返神经深面，至食道表面，注意保护食道，避免损伤，清扫 VIb 区组织^[15]。温蒸馏水反复冲洗创面（图 5），仔细检查确保无明显活动性出血^[16]，留置引流管后关闭切口。

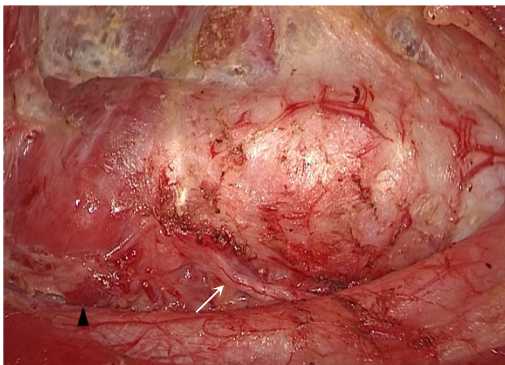


图5 VIb区清扫后画面（如中白色箭头所示为右侧喉返神经，黑色三角所示为上位甲状旁腺）

Figure 5 View of the VI b region after dissection (as indicated by the white arrow, the right recurrent laryngeal nerve, and the black triangle, the superior parathyroid gland)

2 结果

手术在腹腔镜下顺利完成，总手术时间 65 min，出血量约 5 mL。患者术后恢复可，疼痛评分 2 分，无声音嘶哑，无饮水呛咳，无手足麻木抽搐，无畏寒发热不适。术后 2 d 拔管出院，总引流量 100 mL。常规病理提示为（右侧）甲状腺乳头状癌，大小 0.5 cm × 0.5 cm × 0.4 cm，组织学亚型：经典型（图 6）。淋巴结见癌转移（1+4）。其中“右肌

间”纤维脂肪组织内未见淋巴结；“喉前”（0/1），“右侧神经浅面及气管前”（0/1），“右侧神经深面”（1+2），无淋巴结被膜外累犯；肿瘤病理分期（AJCC 第 8 版）：pT1aN1Mx。

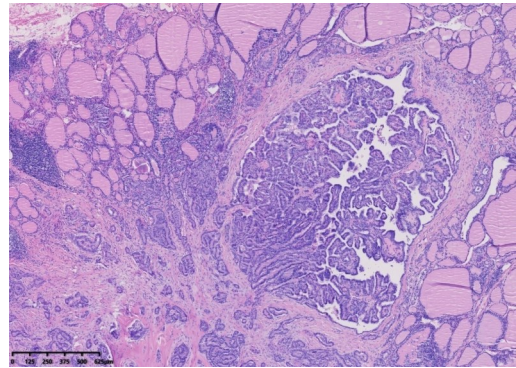


图6 病理图片（HE染色×40）

Figure 6 Pathological image (HE staining ×40)

3 讨论

Shimizu 等^[1]在 1998 年首次报道经锁骨下入路腔镜甲状腺手术，可完成单侧甲状腺切除，甲状腺近全切除及全切等手术^[17-18]。术中于单侧锁骨下可被衣领遮挡的胸壁皮肤内做 3~4 cm 切口，向颈部及对侧锁骨头方向游离皮瓣。该术式需要在颈前部及胸壁做较大范围的分离，必要时需切除部分带状肌，创伤较大。国内有少数中心也曾尝试开展锁骨下术式，但缺乏专用拉钩等设备，且未广泛推广^[3]。近年来，同为侧方入路的无充气经腋窝入路腔镜甲状腺手术以其切口隐蔽、术后颈前部功能保护好等优势^[19-20]，逐渐被外科医生接受并推广。然而该术式在术中由腋窝到甲状腺术区需分离较大的皮瓣范围，皮下隧道长，操作受限明显，操作难度大，中央区充分显露较为困难。相比之下，经锁骨下腔镜甲状腺手术皮下隧道短，器械活动受限少，操作难度明显降低。

本团队在临床工作中已常规开展腔镜辅助甲状腺切除及侧颈清扫、经口、经颈下、经腋窝等腔镜甲状腺手术^[4-8]，结合自身长期腔镜甲状腺手术的经验，开展锁骨下腔镜甲状腺手术^[2]，从手术切口定位、手术路径及手术器械三方面对传统的锁骨下入路术式加以改良，包括：(1) 手术切口定位：为减少疤痕增生，于锁骨下皮纹内设计切口，长约 3~4 cm，切口上缘紧贴锁骨下缘，可避免锁

骨及锁胸关节阻挡,增加中央区下段的暴露,实现中央区的完整显露;(2)手术路径:切开皮肤后,紧贴颈阔肌分离,可以更好地保护锁骨上神经,经胸锁乳突肌胸骨头、锁骨头之间的自然间隙入路,打开带状肌外缘后直接进入甲状腺床区,无需分离颈前区皮瓣,颈前区功能保护更好;(3)手术器械:在腔镜辅助侧颈清扫技术^[4-5]基础上,对手术拉钩进行优化,改进后的特制悬吊拉钩可以利用无菌绷带直接固定到麻醉架上,操作更加简单,该拉钩连接持续负压吸引装置,能及时排出操作时产生的烟雾,保持术野清晰,减少擦镜次数,保证操作的连贯性及安全性。

与颈部开放手术比较,无充气经锁骨下入路腔镜甲状腺手术切口可被衣领遮盖,切口隐蔽性好,美观效果更好,术后患者对外观满意度高。因本术式不游离颈前部皮瓣,未破坏颈前区自然解剖结构,术后吞咽障碍明显减轻,颈前区功能保护好^[20]。同其他入路腔镜甲状腺手术相比^[19, 21-22],经锁骨下入路腔镜甲状腺手术操作距离较短,皮下建腔范围小,能降低手术操作难度,手术操作更加便利。皮瓣分离范围小,术后皮肤麻木范围小;建腔范围小,损伤可明显减小,符合微创理念。本术式采用悬吊拉钩提吊建腔,与以往开展的充气术式相比,无需 CO₂ 充气,设备要求低,可有效避免充气相关并发症及烟囱效应^[23-24],减少或避免肿瘤种植概率,手术更加安全;拉钩悬吊可长时间维持稳定的手术操作空间,术中可以根据需要调整拉钩位置,能够兼顾操作空间的稳定维持和灵活调整;手术中可全程进行持续强力负压吸引,能量器械产生的烟雾可及时被排出,保证视野清晰,减少镜头擦拭频率,保证操作的连贯性,缩短了手术时间。

与颈部开放手术相比较,无充气经锁骨下入路腔镜甲状腺手术的缺点及解决策略包括:(1)在部分患者中央区下段显露欠佳^[25],尤其在开展该术式早期,操作欠熟练时,因而建议在开展该术式的早期尽量选择中央区淋巴结 cN0 的患者。实际操作中,为便于中央区下段显露,可适当打开胸骨甲状肌与胸骨头附着,增加该区域的暴露。(2)下位甲状旁腺原位保留较困难,腔镜手术过程中缺乏对称性牵引,下位甲状旁腺原位保留难度大,对于位于胸腺内及血供条件良好的甲状旁腺应尽量原位保留,切除的甲状腺及淋巴结标本内需仔

细检查,根据 1+X 原则^[26],对离体甲状旁腺做到及时移植。(3)对侧甲状腺腺叶操作要求较高:因受到气管阻挡,对侧甲状腺切除操作难度较大,入喉点暴露尤其困难。本团队通过向操作侧偏头、偏转手术床及入喉点处“脱帽”等方式开展对侧甲状腺手术,效果良好。(4)颈侧区清扫时 II 区暴露较困难:本团队尝试开展经锁骨下切口腔镜下行同侧颈侧区清扫^[27-28],IIb 区显露较困难,经过探索,本团队将切口向中线适当延伸,其中点定位于胸锁乳突肌后缘延长线上,IIb 区显露难度明显降低。与其他入路腔镜甲状腺手术相比,经锁骨下腔镜甲状腺手术中未使用 Trocar 等固定装置,扶镜助手需要自己寻找支点保持镜头稳定,扶镜难度较大,如配合扶镜机器人或以机器人辅助方式手术将大大减少扶镜手的负担^[29-30]。锁骨下腔镜手术疤痕位于一侧锁骨下方,仍相对明显,术前应与患者充分沟通,不适于外观要求高及显著疤痕体质的患者。

综上所述,在合理选择病例的情况下,改良无充气经锁骨下入路腔镜甲状腺手术治疗甲状腺乳头状癌安全可行,中央区清扫彻底,切口隐蔽性好,操作难度低,有临床运用价值。

利益冲突:所有作者均声明不存在利益冲突。

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参考文献

- [1] Shimizu K, Akira S, Tanaka S. Video-assisted neck surgery: Endoscopic resection of benign thyroid tumor aiming at scarless surgery on the neck[J]. *J Surg Oncol*, 1998, 69(3): 178-180. doi: 10.1002/(sici)1096-9098(199811)69:3<178::aid-jso11>3.0.co;2-9.
- [2] 刘跃武,李小毅,高维生,等.经锁骨下途径行腔镜甲状腺手术[J]. *中国普通外科杂志*, 2006, 15(4): 319-320. doi: 10.3969/j.issn.1005-6947.2006.04.029.
- [3] Liu YW, Li XY, Gao WS, et al. Endoscopic thyroid surgery via subclavicular approach[J]. *China Journal of General Surgery*, 2006, 15(4): 319-320. doi: 10.3969/j.issn.1005-6947.2006.04.029.
- [4] 章德广,高力,谢磊,等.改良 Miccoli 手术颈侧区淋巴结清扫术治疗甲状腺乳头状癌 130 例临床分析[J]. *中华外科杂志*, 2016, 54

- (11):864-869. doi: 10.3760/cma.j.issn.0529-5815.2016.11.015.
- Zhang DG, Gao L, Xie L, et al. Modified minimally invasive video-assisted lateral neck dissection for papillary thyroid carcinoma: a series of 130 cases[J]. Chinese Journal of Surgery, 2016, 54(11): 864-869. doi: 10.3760/cma.j.issn.0529-5815.2016.11.015.
- [4] 中国医师协会外科医师分会甲状腺外科医师委员会, 中国研究型医院学会甲状腺疾病专业委员会. 颈前小切口内镜辅助甲状腺癌颈侧区淋巴结清扫术中国专家共识(2023版)[J]. 中国实用外科杂志, 2023, 43(2): 144-150. doi: 10.19538/j. cjps. issn1005-2208.2023.02.05.
- Chinese Thyroid Association, Specialized Committee of Thyroid Disease of Chinese Research Hospital Association. Chinese expert consensus on anterior mini-incision video-assisted lateral neck lymph node dissection for thyroid cancer(2023 edition)[J]. Chinese Journal of Practical Surgery, 2023, 43(2): 144-150. doi:10.19538/j. cjps.issn1005-2208.2023.02.05.
- [5] 章德广, 何高飞, 高力, 等. 无充气额下前庭联合入路腔镜甲状腺手术治疗甲状腺乳头状癌41例临床分析[J]. 中华外科杂志, 2022, 60(2): 154-158. doi: 10.3760/cma. j. cn112139-20210520-00219.
- Zhang DG, He GF, Gao L, et al. Gasless submental-transoral combined approach endoscopic thyroidectomy for papillary thyroid carcinoma: a series of 41 cases[J]. Chinese Journal of Surgery, 2022, 60(2): 154-158. doi: 10.3760/cma. j. cn112139-20210520-00219.
- [6] 何高飞, 章德广, 高力, 等. 内镜辅助咽旁区淋巴结清扫术治疗甲状腺乳头状癌二例[J]. 中华外科杂志, 2019, 57(12):944-946. doi: 10.3760/cma.j.issn.0529-5815.2019.12.014.
- He GF, Zhang DG, Gao L, et al. Endoscopic-assisted parapharyngeal lymph node dissection for papillary thyroid carcinoma: a report of two cases[J]. Chinese Journal of Surgery, 2019, 57(12): 944-946. doi: 10.3760/cma. j. issn. 0529-5815.2019.12.014.
- [7] 何高飞, 谢磊, 姜金汐, 等. 经口腔前庭入路非充气腔镜甲状腺乳头状癌手术的安全性及可行性研究[J]. 中华普通外科杂志, 2023, 38(3): 173-177. doi: 10.3760/cma. j. cn113855-20220410-00236.
- He GF, Xie L, Jiang JX, et al. Clinical analysis of gasless transoral endoscopic thyroidectomy via oral vestibular approach for papillary thyroid carcinoma[J]. Chinese Journal of General Surgery, 2023, 38(3): 173-177. doi: 10.3760/cma. j. cn113855-20220410-00236.
- [8] 章德广, 何高飞, 李建波, 等. 改良无充气经锁骨下入路腔镜甲状腺手术治疗甲状腺乳头状癌70例疗效分析[J]. 中国实用外科杂志, 2022, 42(6): 691-694, 699. doi: 10.19538/j. cjps. issn1005-2208.2022.06.19.
- Zhang DG, He GF, Li JB, et al. Modified endoscopic thyroidectomy via subclavian approach for papillary thyroid carcinoma: an analysis of 70 cases[J]. Chinese Journal of Practical Surgery, 2022, 42(6): 691-694, 699. doi: 10.19538/j. cjps. issn1005-2208.2022.06.19.
- [9] 中国医师协会外科医师分会甲状腺外科医师委员会. 甲状腺及甲状旁腺手术中神经电生理监测临床指南(中国版)[J]. 中国实用外科杂志, 2013, 33(6):470-474.
- Chinese Thyroid Association. Clinical guidelines for intraoperative neuromonitoring in thyroid and parathyroid surgery (Chinese Version) [J]. Chinese Journal of Practical Surgery, 2013, 33(6): 470-474.
- [10] 王平, 谢秋萍. 全腔镜甲状腺手术并发症及防治[J]. 中国实用外科杂志, 2018, 38(6): 635-638. doi: 10.19538/j. cjps. issn1005-2208.2018.06.12.
- Wang P, Xie QP. Prevention and treatment of complications in totally endoscopic thyroidectomy[J]. Chinese Journal of Practical Surgery, 2018, 38(6): 635-638. doi: 10.19538/j. cjps. issn1005-2208.2018.06.12.
- [11] 中国医师协会外科医师分会甲状腺外科医师委员会, 中国研究型医院学会甲状腺疾病专业委员会, 中国医学装备协会外科装备分会甲状腺外科装备委员会. 甲状腺及甲状旁腺术中喉上神经外支保护与监测专家共识(2017版)[J]. 中国实用外科杂志, 2017, 37(11): 1243-1249. doi: 10.19538/j. cjps. issn1005-2208.2017.11.14.
- Chinese Thyroid Association, Specialized Committee of Thyroid Disease of Chinese Research Hospital Association, Committee of Thyroid Surgery of Surgery Branch of China Association of Medical Equipmen. Expert consensus on protection and monitoring of external branches of superior laryngeal nerve during thyroid and parathyroid surgery (2017 edition)[J]. Chinese Journal of Practical Surgery, 2017, 37(11): 1243-1249. doi: 10.19538/j. cjps. issn1005-2208.2017.11.14.
- [12] 何高飞, 章德广, 高力, 等. 改良Miccoli腔镜辅助技术结合神经探测技术解剖保护喉上神经外支[J]. 中华普通外科杂志, 2019, 34(3):255-256. doi: 10.3760/cma.j.issn.1007-631X.2019.03.017.
- He GF, Zhang DG, Gao L, et al. Anatomical protection of external branch of superior laryngeal nerve by improved Miccoli endoscope-assisted technique combined with nerve detection technique[J]. Chinese Journal of General Surgery, 2019, 34(3): 255-256. doi: 10.3760/cma.j.issn.1007-631X.2019.03.017.
- [13] 李武, 伍鹏, 李赞, 等. 经口腔前庭入路腔镜甲状腺手术并发症预防及处理: 单中心1941例及文献报道152例多中心数据分析[J]. 中国普通外科杂志, 2022, 31(11): 1422-1429. doi: 10.7659/j. issn.1005-6947.2022.11.003.
- Li W, Wu P, Li Z, et al. Complications of transoral endoscopic

- thyroidectomy vestibular approach and the management: analysis of a single-center series of 1941 cases and multi-center data of 152 cases reported by literature[J]. *China Journal of General Surgery*, 2022, 31(11): 1422-1429. doi: 10.7659/j. issn. 1005-6947.2022.11.003.
- [14] Zhang DG, Gao L, He GF, et al. Predictors of graft function after parathyroid autotransplantation during thyroid surgery[J]. *Head Neck*, 2018, 40(11):2476-2481. doi: 10.1002/hed.25371.
- [15] Zhang DG, Gao L, Miao YW, et al. Risk factors for posterior to right recurrent laryngeal nerve lymph node metastasis in papillary thyroid carcinoma[J]. *Saudi Med J*, 2014, 35(8):832-837.
- [16] 湖南省预防医学会甲状腺疾病防治专业委员会, 湖南省医学会肿瘤学专业委员会甲状腺肿瘤学组, 湖南省医学会普通外科专业委员会乳腺甲状腺学组, 等. 甲状腺手术后出血防治管理湖南省专家共识[J]. *中国普通外科杂志*, 2023, 32(5):627-639. doi: 10.7659/j.issn.1005-6947.2023.05.001.
- Thyroid Disease Prevention and Treatment Committee of Hunan Preventive Medicine Association, Thyroid Tumor Group of Oncology Society of Hunan Medical Association, Breast and Thyroid Group of General Surgery Society of Hunan Medical Association, et al. Hunan expert consensus on prevention and management of postoperative bleeding after thyroid surgery[J]. *China Journal of General Surgery*, 2023, 32(5): 627-639. doi: 10.7659/j. issn. 1005- 6947.2023.05.001.
- [17] Shimizu K, Kitagawa W, Akasu H, et al. Video-assisted minimally invasive endoscopic thyroid surgery using a gasless neck skin lifting method: 153 cases of benign thyroid tumors and applicability for large tumors[J]. *Biomedicine Pharmacother*, 2002, 56(Suppl 1):88s-91s. doi: 10.1016/s0753-3322(02)00239-1.
- [18] Shimizu K, Shimizu K, Okamura R, et al. Video-assisted neck surgery (VANS) using a gasless lifting procedure for thyroid and parathyroid diseases: "The VANS method from A to Z" [J]. *Surg Today*, 2020, 50(10): 1126-1137. doi: 10.1007/s00595-019-01908-4.
- [19] 徐加杰, 张李卓, 张启弘, 等. 无充气经腋窝腔镜甲状腺手术的临床应用[J]. *中华耳鼻咽喉头颈外科杂志*, 2020, 55(10):913-920. doi: 10.3760/cma.j.cn115330-20200225-00126.
- Xu JJ, Zhang LZ, Zhang QH, et al. Clinical application of the gasless unilateral axillary approach in endoscopic thyroid surgery[J]. *Chinese Journal of Otorhinolaryngology Head and Neck Surgery*, 2020, 55(10): 913-920. doi: 10.3760/cma. j. cn115330-20200225-00126.
- [20] 朱峰, 郭一军, 沈亦斌, 等. 经胸锁乳突肌肌间入路行甲状腺手术对颈前区功能保护研究[J]. *中国实用外科杂志*, 2020, 40(7):847-850. doi: 10.19538/j.cjps.issn1005-2208.2020.07.27.
- Zhu F, Wu YJ, Shen YB, et al. Functional protection of anterior cervical region by thyroid surgery with sternocleidomastoid intermuscular approach[J]. *Chinese Journal of Practical Surgery*, 2020, 40(7): 847-850. doi: 10.19538/j. cjps. issn1005-2208.2020.07.27.
- [21] 中国医师协会外科医师分会甲状腺外科医师委员会, 中国研究型医院学会甲状腺疾病专业委员会, 海峡两岸医药卫生交流协会海西甲状腺微创美容外科专家委员会, 等. 经胸前入路腔镜甲状腺手术专家共识(2017版)[J]. *中国实用外科杂志*, 2017, 37(12): 1369-1373. doi:10.19538/j.cjps.issn1005-2208.2017.12.14.
- Chinese Thyroid Association, Specialized Committee of Thyroid Disease of Chinese Research Hospital Association, Expert Committee on Minimally Invasive Cosmetic Surgery of the Thyroid, Cross-straits Medicine Exchange Association, et al. Expert consensus of endoscopic thyroid surgery via thoracic approach (2017 edition)[J]. *Chinese Journal of Practical Surgery*, 2017, 37(12): 1369-1373. doi: 10.19538/j. cjps. issn1005-2208.2017.12.14.
- [22] 中国医师协会外科医师分会甲状腺外科医师委员会, 中国研究型医院学会甲状腺疾病专业委员会, 海峡两岸医药卫生交流协会台海甲状腺微创美容外科专家委员会, 等. 经口腔前庭入路腔镜甲状腺手术专家共识(2018版)[J]. *中国实用外科杂志*, 2018, 38(10): 1104-1107. doi: 10.19538/j. cjps. issn1005-2208.2018.10.02.
- Thyroid Surgeon Branch of Chinese Physicians Association, Thyroid Disease Committee of Chinese Research Hospital Association, Taiwan Minimally Invasive Cosmetic Thyroid Surgery Expert Committee of Cross-Strait Medical and Health Exchange Association, et al. Expert consensus of endoscopic thyroid surgery via oral vestibular approach (2018 edition) [J]. *Chinese Journal of Practical Surgery*, 2018, 38(10): 1104-1107. doi: 10.19538/j. cjps. issn1005-2208.2018.10.02.
- [23] Kim KN, Lee DW, Kim JY, et al. Carbon dioxide embolism during transoral robotic thyroidectomy: a case report[J]. *Head Neck*, 2018, 40(3):E25-28. doi: 10.1002/hed.25037.
- [24] 刘刚, 王强, 陈旭. 气腹压力对恶性肿瘤生长和种植转移影响的观察 [J]. *中华肿瘤防治杂志*, 2008, 15(23): 1800-1802. doi: 10.3969/j.issn.1673-5269.2008.23.011.
- Liu G, Wang Q, Chen X. Effect of laparoscopic pneumoperitoneum pressure on malignant tumor growth and metastasis in a nude rat model[J]. *Chinese Journal of Cancer Prevention and Treatment*, 2008, 15(23): 1800-1802. doi: 10.3969/j. issn. 1673-5269.2008.23.011.
- [25] 周雨秋, 李超, 蔡永聪, 等. 无充气经腋完全腔镜下胸锁乳突肌后缘与胸锁乳突肌间隙入路治疗甲状腺乳头状癌的比较[J]. *中华外科杂志*, 2021, 59(8): 686-690. doi: 10.3760/cma. j. cn112139-20200817-00651.

- Zhou YQ, Li C, Cai YC, et al. Posterior sternocleidomastoid border approach of gasless transaxillary endoscopic thyroidectomy in patients with papillary thyroid carcinoma: comparison with sternocleidomastoid fascia approach[J]. Chinese Journal of Surgery, 2021, 59(8): 686-690. doi: 10.3760/cma.j.cn112139-20200817-00651.
- [26] 中国医师协会外科医师分会甲状腺外科医师委员会. 甲状腺手术中甲状旁腺保护专家共识[J]. 中国实用外科杂志, 2015, 35(7): 731-736. doi:10.7504/CJPS.ISSN1005-2208.2015.07.11.
- Chinese Thyroid Association. Expert consensus on parathyroid protection during thyroid surgery[J]. Chinese Journal of Practical Surgery, 2015, 35(7): 731-736. doi: 10.7504/CJPS. ISSN1005 - 2208.2015.07.11.
- [27] 章德广, 何高飞, 褚俊杰, 等. 改良无充气经锁骨下入路腔镜颈侧区淋巴结清扫术治疗甲状腺乳头状癌31例临床分析[J]. 中华外科杂志, 2023, 61(9): 801-806. doi: 10.3760/cma.j.cn112139-20221201-00509.
- Zhang DG, He GF, Chu JJ, et al. Modified gasless trans-subclavian approach endoscopic lateral neck dissection for treatment of papillary thyroid carcinoma: a series of 31 cases[J]. Chinese Journal of Surgery, 2023, 61(9): 801-806. doi: 10.3760/cma.j.cn112139-20221201-00509.
- [28] 王源源, 吴国洋, 罗晔哲, 等. 经胸经口联合入路腔镜甲状腺癌颈侧区淋巴结清扫术临床应用[J]. 中国普通外科杂志, 2022, 31(11):1437-1444. doi: 10.7659/j.issn.1005-6947.2022.11.005.
- Wang YY, Wu GY, Luo YZ, et al. Application of endoscopic thyroidectomy plus lateral neck dissection via breast approach combined with transoral approach[J]. China Journal of General Surgery, 2022, 31(11): 1437-1444. doi: 10.7659/j. issn. 1005-6947.2022.11.005.
- [29] 褚亮, 周少波, 蒋磊, 等. 扶镜机器人在经胸乳径路甲状腺良性疾病手术中的应用[J]. 中国普通外科杂志, 2021, 30(9):1079-1085. doi: 10.7659/j.issn.1005-6947.2021.09.011.
- Chu L, Zhou SB, Jiang L, et al. Application of robotic scope holder in breast approach endoscopic thyroidectomy for benign thyroid diseases[J]. China Journal of General Surgery, 2021, 30(9): 1079-1085. doi: 10.7659/j.issn.1005-6947.2021.09.011.
- [30] 中国医师协会外科医师分会甲状腺外科医师委员会, 中国研究型医院学会甲状腺疾病专业委员会. 机器人手术系统辅助甲状腺和甲状旁腺手术专家共识[J]. 中国实用外科杂志, 2016, 36(11):1165-1170. doi: 10.7504/CJPS.ISSN1005-2208.2016.11.08.
- Chinese Thyroid Association, Specialized Committee of Thyroid Disease of Chinese Research Hospital Association. Expert consensus on robot-assisted thyroid and parathyroid surgery[J]. Chinese Journal of Practical Surgery, 2016, 36(11):1165-1170. doi: 10.7504/CJPS.ISSN1005-2208.2016.11.08.

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