



doi:10.7659/j.issn.1005-6947.2024.05.007
http://dx.doi.org/10.7659/j.issn.1005-6947.2024.05.007
China Journal of General Surgery, 2024, 33(5):742-752.

· 甲状腺外科专题论坛 ·

无充气腋窝入路全腔镜下甲状腺切除术的“场景式”扶镜技巧与质量控制

方茜¹, 游硕¹, 曾政¹, 刘睿¹, 方萌¹, 王婉霖¹, 武亚琴¹, 丁田锦昊¹, 王慧玲¹, 张超杰^{1,2}

[1. 湖南省人民医院(湖南师范大学附属第一医院) 乳甲外科, 湖南长沙 410024; 2. 湖南省老年医学研究所, 湖南长沙 410024]

摘要

随着腔镜甲状腺手术的发展及推广, 该手术方式被越来越多的医疗中心和患者接受, 但因其操作空间相对腹腔镜和胸腔镜更狭小, 且镜头和主刀的操作器械共用空间, 两者相互干扰及视角显露等问题, 常成为影响手术的难点。为解决该问题, 笔者从扶镜手的视觉角度出发, 引入场景式的概念, 通过三个部分规范无充气腋窝全腔镜下甲状腺切除手术中扶镜手的操作要点及质量控制。第一部分为规范术前准备及扶镜手操作区域的划分; 第二部分为扶镜操作要点: “眼关六路、三个平面、进退展转”的十二字扶镜质量控制; 第三部分为三层递进镜下视野场景的扶镜质量控制: 将手术区域分为喉返神经区、甲状腺上极区、气管前区, 借此来规范扶镜手在不同场景的扶镜要点和视角引导。通过扶镜技巧与质量控制, 手术过程中的视野显露更充分、清晰, 视觉引导更流畅, 镜头、器械之间的相互干扰更小, 术中平均擦拭或浸泡镜头次数显著减少, 甚至手术过程中无需二次擦镜, 保证操作的连续性, 节省了手术时间。笔者就以上要点、操作技巧及细节进行阐述。

关键词

甲状腺肿瘤; 甲状腺切除术; 内窥镜; 场景
中图分类号: R736.1

"Scene-based" camera-holding skills and quality control for gasless axillary total endoscopic thyroidectomy

FANG Qian¹, YOU Shuo¹, ZENG Zheng¹, LIU Rui¹, FANG Meng¹, WANG Wanlin¹, WU Yaqin¹, DING Tianjinhao¹, WANG Huiling¹, ZHANG Chaojie^{1,2}

[1. Department of Breast and Thyroid Surgery, Hunan Provincial People's Hospital (the First Affiliated Hospital of Hunan Normal University), Changsha 410024, China; 2. Hunan Research Institute of Geriatrics, Changsha 410024, China]

Abstract

With the development and popularization of endoscopic thyroidectomy, this surgical approach is increasingly accepted by more medical centers and patients. However, due to its relatively narrow operating space compared to laparoscopy and thoracoscopy, as well as issues such as the shared space between the lens and the surgical instruments manipulated by the primary surgeon, mutual interference, and limited visibility, it often becomes a challenging aspect of the surgery. To address this issue, the

收稿日期: 2024-01-27; 修订日期: 2024-04-24。

作者简介: 方茜, 湖南省人民医院(湖南师范大学附属第一医院)主治医师, 主要从事乳腺、甲状腺良恶性肿瘤外科诊疗方面的研究(游硕、曾政为共同第一作者)。

通信作者: 张超杰, Email: zhangchaojie74@126.com; 王慧玲, Email: jonnce.1018@163.com

authors, from the perspective of the camera-holding assistant, introduce the concept of scene-based guidance. This is achieved by standardizing the key points of operation and quality control for camera-holding assistant during gasless axillary endoscopic thyroidectomy in three parts. The first part standardizes preoperative preparation and the division of the operating area of the camera-holding assistant. The second part outlines the key points of endoscope operation: "YAN GUAN LIU LU, SAN GE PING MIAN, JIN TUI ZHAN ZHUAN" a twelve-character quality control mantra for the camera holding. The third part focuses on the quality control of the endoscopic view field in three progressively deeper levels: dividing the surgical area into the recurrent laryngeal nerve area, the upper pole of the thyroid area, and the pre-tracheal area, thereby standardizing the key points and visual guidance for the camera-holding assistant in different scenarios. Through camera-holding skills and quality control, the surgical field is more fully and clearly visible, visual guidance is smoother, mutual interference between the lens and instruments is reduced, the average number of lens wipes or soaks during surgery is significantly reduced, and even secondary wiping of the lens during surgery is unnecessary, ensuring continuous operation and saving surgical time. Here, the authors elaborate on the above points, operation techniques, and details

Key words

Thyroid Neoplasms; Thyroidectomy; Endoscopes; Scene

CLC number: R736.1

随着甲状腺癌发病率的日益增高,外科手术仍然是目前最重要、最有效的治疗手段,在治愈疾病保证手术治疗效果的同时,如何获得最大程度上达到美容与微创效果成为甲状腺疾病患者和甲状腺外科医生共同追求的目标^[1]。2006年,韩国 Yoon 等^[2]最先报道了无充气单侧腋窝入路腔镜甲状腺手术。经过数十年的发展和改进,2017年郑传铭等^[3]在国内首次报道经腋窝入路的腔镜甲状腺手术,从此腔镜甲状腺手术开始在国内逐步推广。目前腔镜甲状腺手术术式相对较多,如“百花齐放、百家争鸣”,主要路径有经胸乳、经腋窝、经口、经耳后等多种路径,按是否充入气体分为充气和无充气两种建腔方式^[4-6]。无充气腋窝入路全腔镜下甲状腺手术经葛明华、郑传铭团队的不断创新和发展,具有经腋窝自然褶皱切口,小而隐蔽,颈部无疤痕,完美到达美容效果;利用颈部肌肉的自然间隙建立操作空间,无需切开颈前肌群,术后颈前区功能得到完美保护;术中无需充入气体,避免了皮下气肿等相关并发症,通过持续负压吸引能保持无烟雾的清晰术腔等明显优势,是一种可行、安全的腔镜手术术式^[3-4, 6-13]。

无充气腋窝入路全腔镜下甲状腺手术操作空间相对腹腔镜和胸腔镜更狭小,且镜头和主刀的操作器械共用空间,加之腔镜下的视角暴露问题,

及术者与助手配合默契程度等多种原因限制其发展。为了克服上述问题,笔者回顾性分析200余台腔镜甲状腺手术的扶镜经验,总结出“眼关六路、三个平面、进退展转”的扶镜质量控制十二字方针,并引入场景扶镜的理念,通过手术视野场景的三层递进,对镜头视角进行质量控制,对扶镜手提出标准化手术操作建议,从而规范扶镜操作空间及操作要点,能使扶镜手更快、更好地掌握无充气腋窝入路全腔镜下甲状腺切除术的扶镜技巧,缩短扶镜学习曲线,确保手术顺利实施,减少手术并发症^[14-15]。本文就以上内容进行详细阐述。

1 术前准备

直径10 mm的30°腔镜及高清成像系统;常规内镜器械^[7]、生理盐水及肾上腺素。术前配合:(1)麻醉起效后,患者仰卧,需做到“两贴”“两高”,即患侧躯干紧贴手术床沿,患侧手臂下缘紧贴手术床手托板下缘;患侧上肢保持肩关节松弛度自然外展置于托板上,最大程度显露腋窝;肩部垫高,肩胛间隙垫高,保持头过仰后伸位,后颈部垫卷形垫,防止后颈部悬空,软头圈固定头部,头部可稍偏向健侧或不偏,避免出现患侧耸肩及锁骨过高^[7, 16-17]。(2)麻醉起效后,于距腋顶约2 cm

处沿皮纹标记切口长约 3.5~4.5 cm, 利用 Z 线 (Zero-line) 确定辅助操作孔的位置, 于该位置行 0.5 cm 切一小切口, 置入另一操作器械^[7, 17-18]。取 100 mL 生理盐水+肾上腺素 0.5 mL, 于标记处行皮内注射, 减少切皮时创面渗血、加强伤口的保护。(3) 消毒范围 (单侧为例) 为内至患侧上臂过肘关节、腋后线水平, 外至对侧腋前线水平, 上到唇下缘至耳后连线, 下到乳头下方 3 横指水平。(4) 消毒铺单后、切皮前完成腔镜器械的组装, 并用 50~60 °C 灭菌注射用水 (使用生理盐水容易在镜头表面形成结晶) 浸泡镜头 5~8 min。

2 扶镜要点与质量控制

2.1 基本要点

助手和术者分别落座于患者外展手臂的两边, 助手坐于患侧头侧端, 从切口近头侧端进镜^[7, 19-20]。助手操作、活动范围始终为腔隙建立后切口近头端 1/2 的区域, 术者的操作范围为腔隙建立后近足侧 1/2 的区域, 在明确区域划分的质量控制下, 能有效的避免操作过程中助手对术者的器械及视觉的干扰 (图 1)。如在手术操作过程中出现手术画面显示不佳, 助手经多次角度、方位调整仍无法充分暴露, 不能达到术者的要求时, 可以将镜头归零位: 即稳定底座, 缓慢退镜, 将镜头光纤调整到与手臂横轴平行, 然后缓慢重新进镜, 以便寻找最佳进镜角度、方位。在手术过程中按照“眼关六路、三个平面、进退展转”的扶镜质量控制十二字方针, 循序渐进、与术者密切配合完成手术。

2.2 扶镜质量控制十二字方针

第一, “眼关六路”的质量控制。“眼”为术者的眼就是助手手中的镜头, 甲状腺腔镜的镜头为 30° 镜, 通过转动光纤, 提供多角度广视野的手术画面。“关”为四个关键点: 双手扶镜、显露充分、底座稳定、画面清晰。双手扶镜的质量控制: 腔镜手术中因相对操作空间狭小, 单手扶镜易导致手术画面晃动, 加之手术过程中需根据术者需求随时调整手术视野角度, 所以在整个手术操作中, 扶镜手需一手扶稳底座, 置于手臂内侧, 另一只手扶住镜头保持镜头稳定的同时, 还需根据术中视野需要调整光纤位置 (图 2)。显露充分的质量控制: 助手应利用 30° 镜, 为术者提供良好的术野, 充分显露手术操作区域, 还要在狭小有限

的空间内避开术者操作的器械和拉钩, 另外助手还需充当“调光师”, 注意镜头光线的强弱, 让术者看清每一个细节。底座稳定的质量控制: 镜身底座平面与术野平面平行或使镜身底座纵轴与术野平面垂直。底座紧贴手臂为支点, 避免悬空。画面清晰的质量控制: 助手需时刻注意镜头情况, 予以擦拭、浸泡镜头、调整微调等, 确保画面清晰, 注意距离超声刀头的有效热距离, 尽量避免镜头因为组织液、血液及热气污染, 造成反复擦镜。“六”为六个角度: 通过旋转光纤、调整底座、进退镜头等单独或复合操作, 使术者能全面地看到手术腔隙, 于镜头下完整显露内近头侧上缘、近头侧下缘、近足侧上缘、近足侧下缘、顶面及底面这六个角度。“路”为两个镜头入路: 靠头侧、中间位^[7, 19]。头侧入路因为紧贴胸大肌表面, 镜头位于切口上方, 可以有效的避免器械之间的干扰, 使术者相对有更大的操作空间, 但对于上、下眼角的充分暴露, 有一定的局限性, 可以通过调整光纤及底座来弥补。中间入路虽然可以充分显露上下眼角, 但因处于正中位置易与拉钩及术中操作器械互相干扰。笔者多采用头侧入路, 但如果遇到肌肉或血管变异等特殊情况, 会改成中间入路。

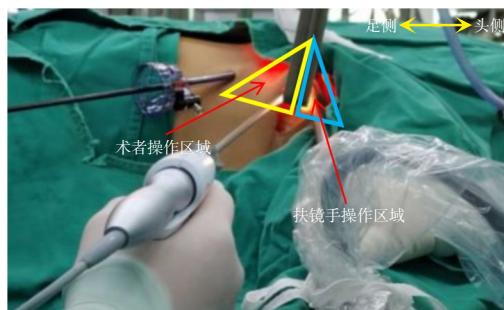


图 1 以拉钩为顶端, 平行于胸大肌表面为底面的三角形区域, 助手操作活动范围为腔隙建立后切口近头端 1/2 的区域 (蓝色三角形); 术者的操作范围为腔隙建立后近足侧 1/2 的区域 (黄色三角形)

Figure 1 The triangular area, with the hook as the apex and parallel to the surface of the pectoralis major muscle as the base, defines the working area for the assistant, which covers the proximal half of the incision after the establishment of the working space (blue triangle); the surgeon's working area covers the distal half of the incision after the establishment of the working space, towards the lateral aspect (yellow triangle)



图2 腋窝入路双手扶镜 A: 右侧入路; B: 左侧入路

Figure 2 Axillary approach with two-handed endoscope holding A: Right-sided approach; B: Left-sided approach

第二,“三个平面”的质量控制。在无充气腋窝入路全腔镜下甲状腺手术中,随着操作层次的不深入,扶镜手需跟随手术进程进行三个不同参照解剖平面的转换,这三个解剖平面分别为:胸大肌平面、胸锁乳突肌锁骨头平面和气管平面^[7]。(1)胸大肌平面:以此解剖平面作为参照物下完成胸大肌平面建立腔隙^[7,19]。镜头位于胸大肌平面,术中视野始终与胸大肌平行,并通过调节光纤位置完成该腔隙建立的镜下视野引导。当主刀沿着胸大肌肌间沟(胸大肌锁骨部与胸肋部的交界,亦是自锁骨平面向下的第一胸大肌肌间沟)^[7]方向,找到胸锁乳突肌胸骨头与锁骨头之间的间隙,并打开该间隙置入专用拉钩^[19-20](图3)时,扶镜手需注意外展底座,光纤平行于患者手臂,让镜头视角完全显露拉钩顶端。(2)胸锁乳突肌锁骨头平面:以此解剖平面作为参照物下完成手术腔隙建立的第二部分。该阶段镜头越过胸大肌锁

骨部,术中视野始终与胸锁乳突肌锁骨头平行,同样通过调节光纤位置完成该腔隙建立的镜下视野引导。在主刀打开胸骨甲状肌与甲状腺之间的间隙时,为充分暴露颈鞘内侧缘与胸骨甲状肌的间隙,扶镜手需适当抬高镜头,光纤稍偏向足侧,使视角显露颈内静脉,确保质量与安全(图4)。(3)气管平面(头侧高30°):以此解剖平面作为参照物下完成无充气腋窝入路全腔镜下甲状腺切除的核心操作,为配合术者的操作习惯及视觉角度,建议将头侧略抬高30°左右^[7,19]。因为这一阶段的操作精细且需处理喉返神经及甲状腺上下极血管等重要组织,扶镜手的质量控制显得尤为重要,需要扶镜手保持镜头稳定,并通过光纤的调整,展现良好的手术视野,引导术者完成喉返神经的游离、患侧甲状腺及中央区淋巴脂肪组织前、后界的游离、甲状腺上下极血管的游离及离断、甲状腺峡部的离断等(图5)。

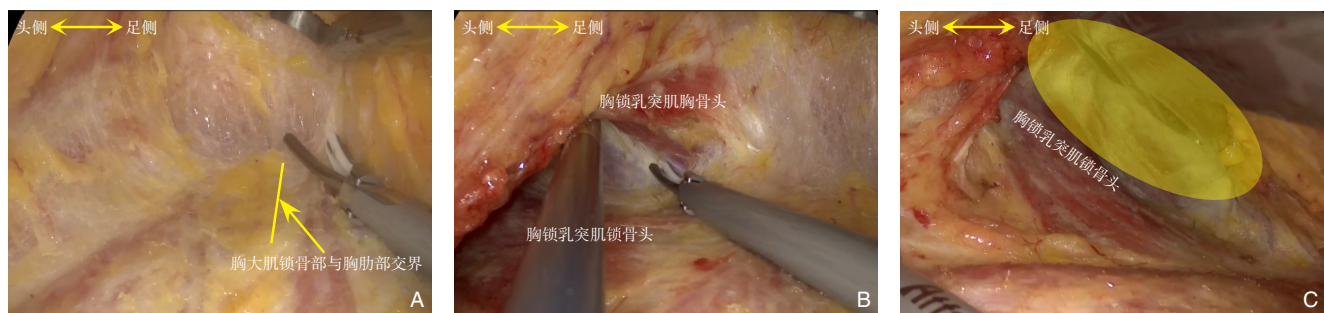


图3 胸大肌平面 A: 于胸大肌平面游离皮瓣; B: 沿肌间沟找到胸锁乳突肌胸骨头、锁骨头之间的间隙; C: 将拉钩置入胸锁乳突肌胸骨头、锁骨头之间的间隙(视角重点为黄色区域)

Figure 3 Pectoralis major plane A: Dissecting the skin flap along the plane of the pectoralis major muscle; B: Identifying the space between the sternal head and clavicular head of the sternocleidomastoid muscle along the muscle interstice groove; C: Inserting the retractor into the space between the sternal head and clavicular head of the sternocleidomastoid muscle (focus on the yellow area)

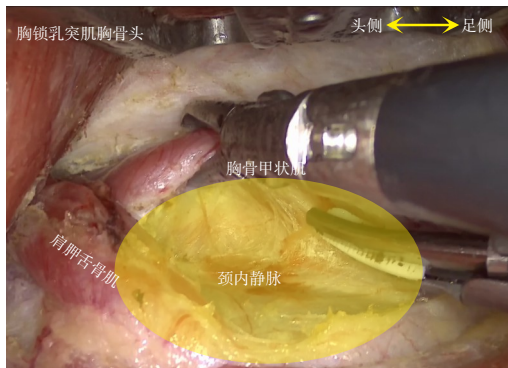


图4 提起胸骨甲状肌，打开其与甲状腺之间的间隙，注意保护好下方的颈内静脉（视角重点显露部分为淡黄色区域）

Figure 4 Elevation of the sternothyroid muscle to open up the space between it and the thyroid gland, being careful to protect the underlying internal jugular vein (highlighted area in light yellow)

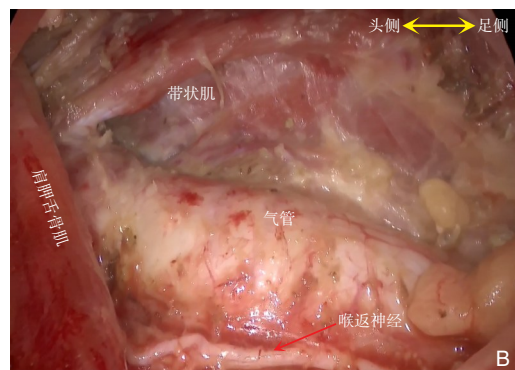
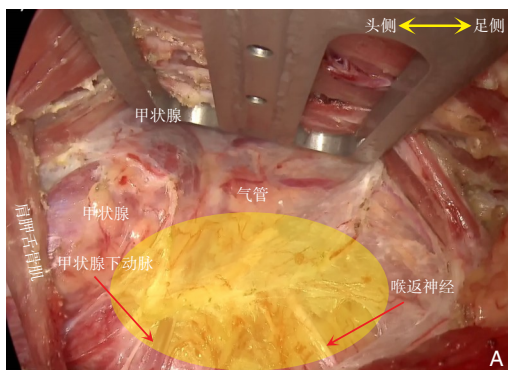


图5 气管平面 A: 找到患侧甲状腺下动脉及喉返神经（视角重点显露部分为淡黄色区域）；B: 完整切除患侧甲状腺及中央区淋巴脂肪组织后

Figure 5 Tracheal plane A: Identification of the inferior thyroid artery and recurrent laryngeal nerve on the affected side (highlighted area in light yellow); B: After complete removal of the affected side thyroid gland and central lymph-adipose tissue

第三，“进退展转”的质量控制。因为甲状腺腹腔镜拉钩的特形性，使得在调整拉钩位置及重新置入拉钩时，拉钩顶端显露不清，扶镜手不仅仅需配合进镜、退镜，还需要额外的旋转光纤、外展底座等动作，以充分暴露拉钩顶端，防止拉钩两端的血管被机械撕裂而出血。

3 “三层递进”场景式操作的质量控制

3.1 基本要点

将拉钩置于胸骨甲状肌与甲状腺间隙内后，颈深筋膜中层内组织悬吊，形成稳定的手术腔隙。按照笔者中心标准化手术步骤结合扶镜显露区域

性的划分，笔者分析总结后，提出了场景式“三层递进”操作，将该空间划分成三个区域。上界为胸骨甲状肌，下界为颈血管鞘内侧缘，头侧界为甲状腺上极，足侧界为无名动脉上方，横轴以气管为界，纵轴以肩胛舌骨肌为界，分为三个区域（图6），对应手术操作的“三层递进”步骤，着重强调扶镜手的镜头、光纤调整及镜下视觉角度引导的质量控制，以此进行临床实践验证，有效的减少了因视角盲区或器械干扰而导致的出血、损伤等。无充气腋窝全腔镜下甲状腺手术该阶段的操作多开始于喉返神经区，按照喉返神经→甲状腺上极→气管前的顺序完成，以右侧为例，说明如下。

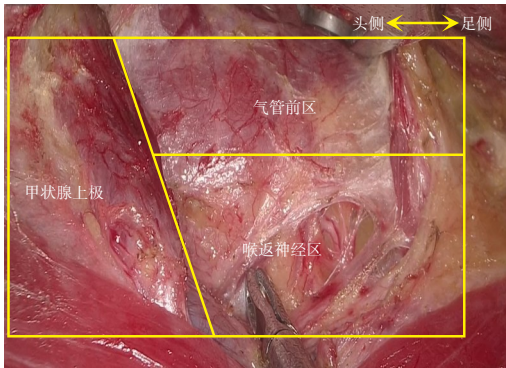


图6 三层递进场景区域划分(上界为胸骨甲状肌,下界为颈血管鞘内侧缘,头侧分界为甲状腺上极,足侧分界为无名动脉上方,以肩胛舌骨肌下缘及气管水平分别为标记线,将上述操作范围分为喉返神经区、甲状腺上极区、气管前区)

Figure 6 Three-layer progressive scene area division (with the upper boundary being the sternothyroid muscle, the lower boundary being the inner edge of the cervical vascular sheath, the cephalic boundary being the upper pole of the thyroid gland, and the caudal boundary being above the brachiocephalic trunk; using the lower border of the omohyoid muscle and the level of the trachea as reference lines, the above-mentioned operating area is divided into the recurrent laryngeal nerve area, the upper pole of the thyroid area, and the pre-tracheal area)

3.2 喉返神经区扶镜手的质量控制

术者打开颈深筋膜中层,找到患侧甲状腺下动脉和喉返神经。镜头位于头侧,以气管为水平面,头侧高 30° ,越过胸锁乳突肌锁骨部或胸锁乳突肌锁骨部不超过整个视野宽度的 $1/3$ (图7A)。视角角度图见图7B。术者离断甲状腺下动脉,游

离喉返神经直至入喉处,同时将喉返神经周围中央区淋巴脂肪组织游离(游离右侧喉返神经时需注意将神经后方、食管前方的右VIB区淋巴脂肪组织清扫)。镜头位于头侧,头侧高 30° ,光纤先稍偏向头侧;当术者游离喉返神经时镜头需稍抬高,以更好的显露右VIB区全貌,且可适当将光纤偏向足侧,镜下视角由足侧向头侧显露(沿神经走行方向),以顺应术者操作需要(图7C-D)。视觉角度见图7E-F。

3.3 甲状腺上极区操作

术者于喉返神经入喉处上方找到环甲间隙并打开,显露甲状腺上极,保护好甲状旁腺,离断上极血管,沿系膜间隙将甲状腺上极完全游离凝固切断。镜头位于头侧,以气管为平面,头侧高 30° ,将光纤置于平行位,底座稍外展(图8A-B)。视觉角度见图8C。

3.4 气管前区的操作

术者将甲状腺及中央区组织向外下方牵拉,显露甲状腺前被膜与带状肌之间的间隙,将其分离。镜头位于头侧,以气管为平面,头侧高 30° ,将光纤置于平行位(图9A)。视觉角度见图9B。术者在无名动脉上方游离右中央区淋巴脂肪组织,通过前后夹击,将右中央区组织离断,注意保护好胸腺。镜头位于头侧,以气管为平面,头侧高 30° ,将光纤置于平行位(图9C-D)。术者将甲状腺及中央区组织向外上方牵拉,沿对侧带状肌内缘由下而上离断中央区脂肪组织、甲状腺峡部、锥状叶及喉前淋巴结^[9]。镜头稍偏向足侧,以气管为平面,头侧高 30° ,将光纤稍偏向足侧(图9E)。视觉角度图见图9F。

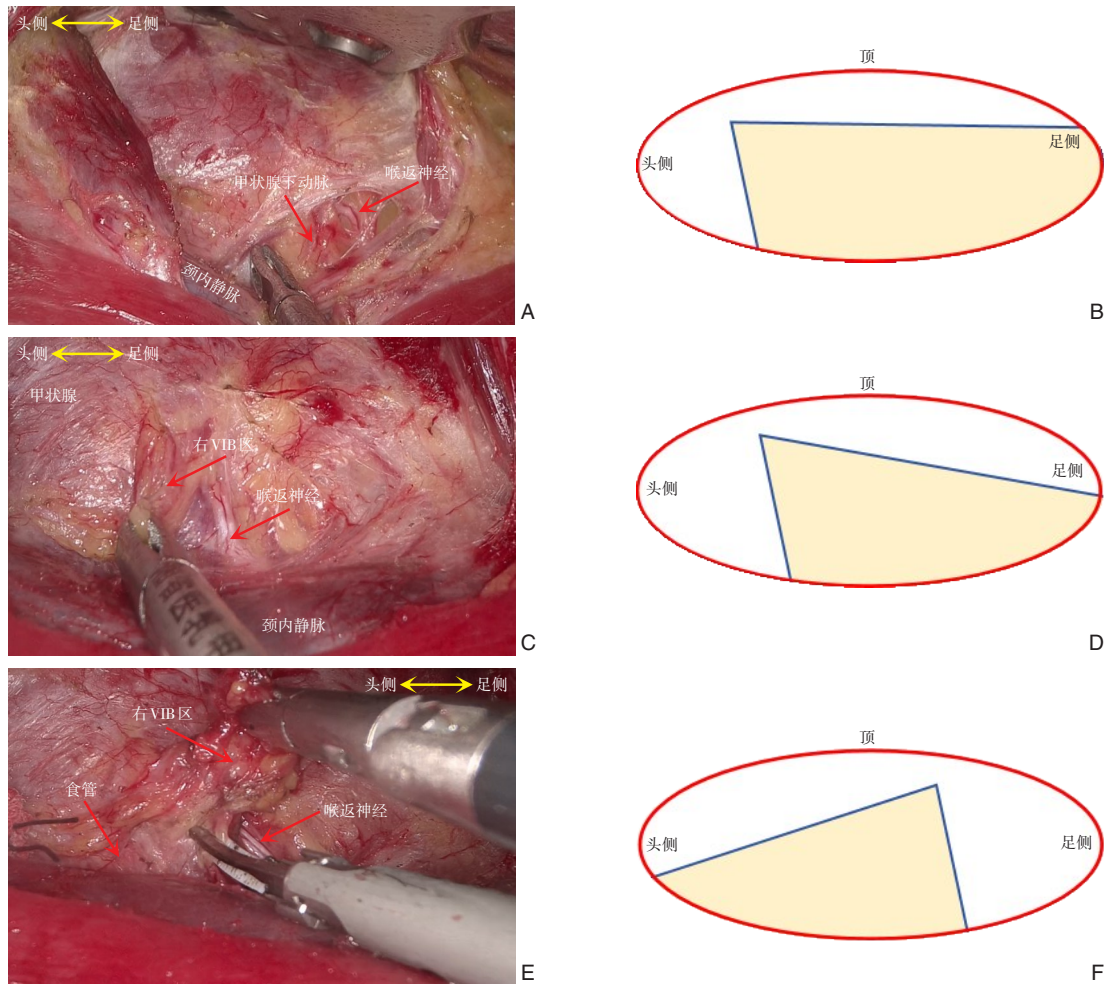


图7 喉返神经区域 A: 找到甲状腺下动脉及喉返神经; B: 视角角度为从近头侧向足侧及底面 (浅黄色区域); C: 游离喉返神经; D: 视角角度为从近头侧向足侧, 光纤稍偏向足侧 (浅黄色区域); E: 上下夹击, 将食管前间隙与喉返神经后方的淋巴脂肪组织 (右VIB区) 游离; F: 让视角角度从足侧到头侧 (浅黄色区域)

Figure 7 Recurrent laryngeal nerve area A: Identifying the inferior thyroid artery and recurrent laryngeal nerve; B: View angle from the cephalic side to the caudal and basal side (light yellow area); C: Dissecting the recurrent laryngeal nerve; D: Clamping and dissecting the lymphatic adipose tissue behind the recurrent laryngeal nerve and the pre-esophageal space (right VIB area); E: View angle from the cephalic side to the caudal side, with the fiber optic slightly inclined towards the caudal side; F: Changing the view angle from the foot side to the head side (light yellow area)

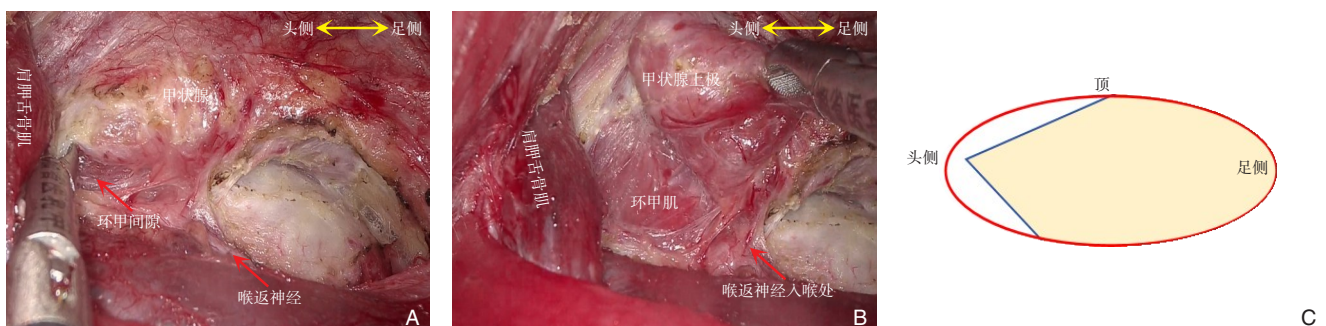


图8 甲状腺上极区 A: 打开环甲间隙; B: 离断甲状腺上极血管, 将甲状腺上极完全游离; C: 视角角度从头侧向足侧, 同时显露术野的顶部和底部 (浅黄色区域)

Figure 8 Upper pole of the thyroid area A: Opening the cricothyroid space; B: Ligation of the superior thyroid vessels and complete isolation of the upper pole of the thyroid gland; C: View angle from the cephalad side to the caudad side, simultaneously exposing the top and bottom of the surgical field (light yellow area)

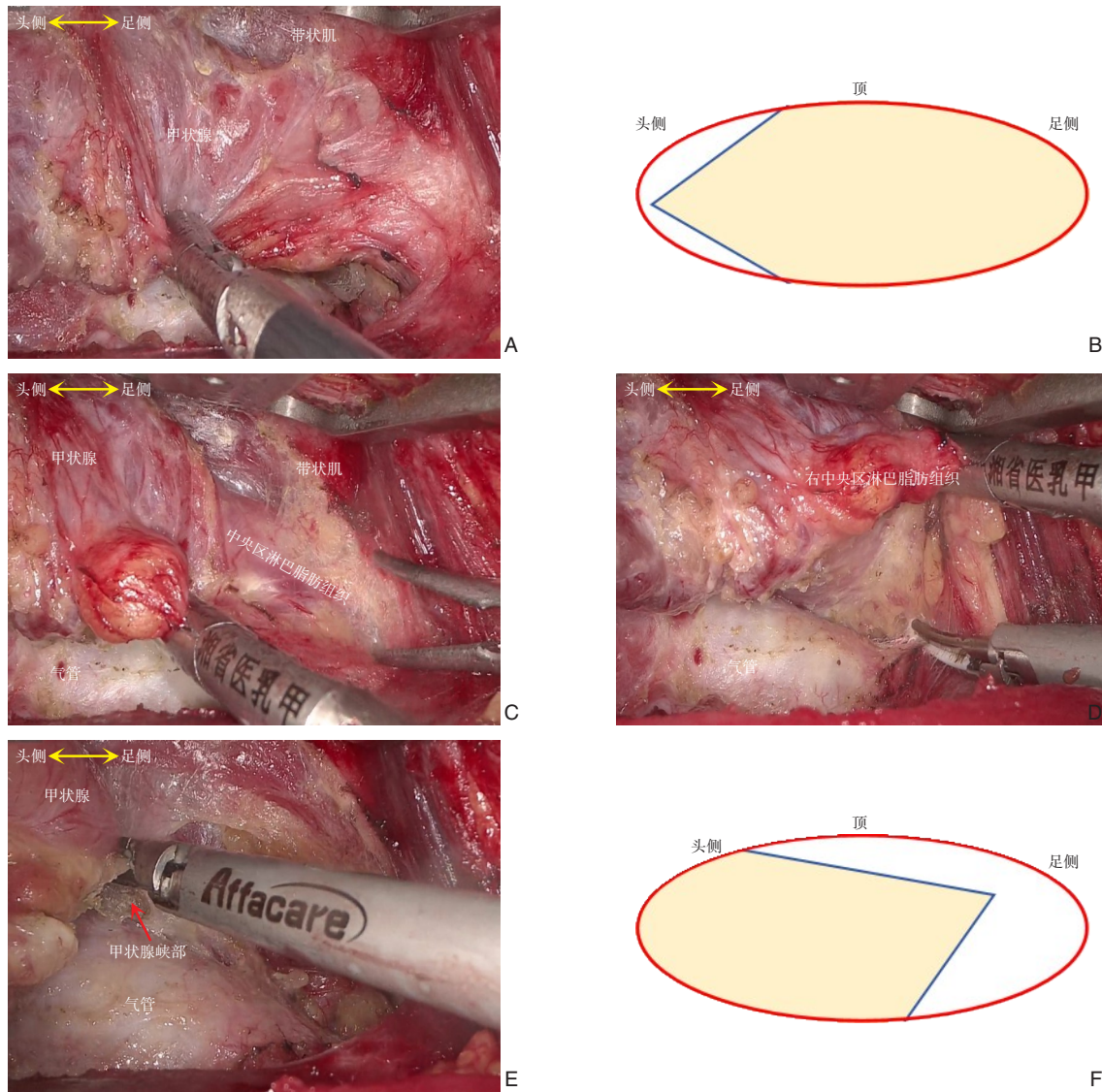


图9 气管前区 A: 将甲状腺前被膜从带状肌上分离; B: 视角角度从头侧向足侧, 同时显露术野的顶部和底部 (浅黄色区域); C: 于带状肌下将右中央区组织分离; D: 在气管前将右中央区组织分离; E: 由下而上分离甲状腺峡部; F: 视觉角度从足侧至头侧 (浅黄色区域)

Figure 9 Pre-tracheal area A: Separating the thyroid pretracheal fascia from the strap muscle; B: View angle from the cephalic side to the caudal side, simultaneously exposing the top and bottom of the surgical field (light yellow area); C: Tissue separation of the right central area below the strap muscle; D: Tissue separation of the right central area in front of the trachea; E: Separating the isthmus of the thyroid gland from bottom to top; F: Visual angle from foot to head (light yellow area)

4 总结与讨论

甲状腺癌在2022年我国恶性肿瘤发病中排在第三位, 共计46.61万例, 女性发病率较男性高^[21]。无充气腋窝入路腔镜甲状腺手术因其特殊的解剖入路、对颈前肌肉损伤小、美容度高等多种优势, 成为2016年美国甲状腺协会(ATA)发布的颈外入路内镜甲状腺手术声明中推荐的手术入路之一^[22]。在无充气腋窝入路全腔镜甲状腺手术中,

由于甲状腺本身血运丰富^[23], 周围有重要的神经及血管^[24], 术中扶镜手应充分利用好腔镜清晰的术野及其独特的放大优势, 让术者仔细辨认甲状腺周边重要的解剖结构, 避免因误伤造成出血、神经损伤等并发症, 甚至中转开放^[25-26]。

腋窝入路无充气腔镜甲状腺手术, 由于采用侧方入路, 可更精确地暴露喉返神经、喉上神经及甲状旁腺^[7, 13, 27-28], 从而更好地减少损伤。但因经腋窝入路无充气手术中镜头无固定支点, 故扶

镜难度大,扶镜手难以完全控制稳定镜头,镜下视野容易不稳,导致术者无法对术野进行清晰辨认和观察,对手术操作带来不利影响^[17, 26, 29-30],加之甲状腺腔镜手术的空间特殊性,在整个手术过程中,助手的配合显得尤为重要^[13]。

虽然目前有不少中心分享了各自腔镜甲状腺手术的扶镜心得体会,但对于初期开展此类手术的中心来说,手术画面的稳定性、清晰性和手术视野的精准性是整个手术的关键,相应的经验分享相对较少,本篇总结的手术区域视角引导、不同场景下光纤、镜头的调整及相应的质量控制,使助手在扶镜初期通过规范化的操作、掌握不同场景下的视角转换要点,对充分暴露手术视野有较好的指导作用,缩短学习曲线,减少因术野稳定性、清晰性及精准性偏颇导致的出血、损伤等并发症。笔者中心通过十二字方针和三层递进场景式扶镜质量控制后,手术视野显露更充分、清晰,视觉引导更流畅,镜头、器械之间的相互干扰更小,术中平均擦拭或浸泡镜头次数显著减少,甚至手术过程中无需二次擦镜,保证操作的连续性,节省了手术时间。笔者中心自2022年3月—2023年10月共完成腔镜甲状腺手术1 100余例,随着术者和扶镜手分别进行质量控制与安全管理,加之术者的熟练度、其与扶镜手配合默契度的升高,平均手术时间由原来的2~2.5 h明显缩短到现在的1 h左右。

笔者的经验分享仅在于提升扶镜手与主刀的配合,减少相互干扰,规范手术视角角度,让手术更加的安全快捷,也让助手镜下视野的角度转换更加流畅,增加手术的观赏性。每个中心的主刀操作习惯和助手扶镜习惯有所不同,以上经验仅供参考和倡导扶镜质量控制对手术配合的重要性,希望对刚开展无充气腋窝入路全腔镜下甲状腺切除手术的中心提供一定的帮助。

利益冲突:所有作者均声明不存在利益冲突。

作者贡献声明:方茜负责论文撰写、分析、图像采集、扶镜质量控制;游硕、曾政负责资料收集、扶镜质量控制;方萌、刘睿负责手术辅助及翻译;武亚琴、王婉霖、丁田锦负责辅助文章撰写;张超杰负责选题设计、文稿审核;王慧玲负责文稿修改;张超杰、王慧玲为主要手术实施者。

参考文献

- [1] 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.
- [2] Yoon JH, Park CH, Chung WY. Gasless endoscopic thyroidectomy via an axillary approach: experience of 30 cases[J]. Surg Laparosc Endosc Percutaneous Tech, 2006, 16(4): 226-231. doi: 10.1097/00129689-200608000-00006.
- [3] 郑传铭,毛晓春,王佳峰,等.无充气腋窝入路完全腔镜下甲状腺癌根治术效果初步评价初期体会[J].中国肿瘤临床,2018,45(1):27-32. doi:10.3969/j.issn.1000-8179.2018.01.801.
Zheng CM, Mao XC, Wang JF, et al. Preliminary evaluation of effect of endoscopic thyroidectomy using the gasless unilateral axillary approach[J]. Chinese Journal of Clinical Oncology, 2018, 45(1):27-32. doi:10.3969/j.issn.1000-8179.2018.01.801.
- [4] 郑传铭,徐加杰,王佳峰,等.无充气腋窝入路腔镜甲状腺手术的进展与展望[J].中国普外基础与临床杂志,2021,28(10):1266-1269. doi:10.7507/1007-9424.202108088.
Zheng CM, Xu JJ, Wang JF, et al. Progress and prospect of endoscopic thyroid surgery via inflatable axillary approach[J]. Chinese Journal of Bases and Clinics in General Surgery, 2021, 28(10):1266-1269. doi:10.7507/1007-9424.202108088.
- [5] de Vries LH, Aykan D, Lodewijk L, et al. Outcomes of minimally invasive thyroid surgery - A systematic review and meta-analysis[J]. Front Endocrinol, 2021, 12: 719397. doi: 10.3389/fendo.2021.719397.
- [6] 郑传铭,徐加杰,蒋烈浩,等.无充气腋窝入路完全腔镜下甲状腺叶切除的方法:葛-郑氏七步法[J].中国普通外科杂志,2019,28(11):1336-1341. doi:10.7659/j.issn.1005-6947.2019.11.003.
Zheng CM, Xu JJ, Jiang LH, et al. Endoscopic thyroid lobectomy by a gasless unilateral axillary approach: Ge & Zheng's seven-step method[J]. China Journal of General Surgery, 2019, 28(11):1336-1341. doi:10.7659/j.issn.1005-6947.2019.11.003.
- [7] 张超杰,王慧玲.无充气经腋窝入路全腔镜甲状腺手术质量控制与安全管理[J].中国普通外科杂志,2023,32(11):1663-1676. doi: 10.7659/j.issn.1005-6947.2023.11.005.
Zhang CJ, Wang HL. Surgical quality control and safety management of complete endoscopic thyroidectomy via gasless axillary approach[J]. China Journal of General Surgery, 2023, 32(11):1663-1676. doi:10.7659/j.issn.1005-6947.2023.11.005.

- [8] 郭海巍,徐加杰,葛明华,等.无充气腋窝入路腔镜手术结合神经探测技术对甲状腺上极周围结构和功能保护的研究[J].中国普外基础与临床杂志,2023,30(2):142-147. doi:10.7507/1007-9424.202209084.
- Guo HW, Xu JJ, Ge MH, et al. Study on the protection of the structure and function around the upper pole of thyroid gland by endoscopic surgery combined with nerve detection through the gasless axillary approach[J]. Chinese Journal of Bases and Clinics in General Surgery, 2023, 30(2): 142-147. doi: 10.7507/1007-9424.202209084.
- [9] Song CM, Ji YB, Bang HS, et al. Postoperative pain after robotic thyroidectomy by a gasless unilateral axillo-breast or axillary approach[J]. Surg Laparosc Endosc Percutan Tech, 2015, 25(6): 478-482. doi:10.1097/SLE.000000000000204.
- [10] 卢曼,孙金中,孙圣荣.腔镜甲状腺手术发展与选择[J].中国普外基础与临床杂志,2022,29(6):816-822. doi:10.7507/1007-9424.202107097.
- Lu M, Sun JZ, Sun SR. Development and choice of endoscopic thyroid surgery[J]. Chinese Journal of Bases and Clinics in General Surgery, 2022, 29(6):816-822. doi:10.7507/1007-9424.202107097.
- [11] Sung ES, Ji YB, Song CM, et al. Robotic thyroidectomy: comparison of a postauricular facelift approach with a gasless unilateral axillary approach[J]. Otolaryngol Head Neck Surg, 2016, 154(6):997-1004. doi:10.1177/0194599816636366.
- [12] Tae K, Song CM, Ji YB, et al. Oncologic outcomes of robotic thyroidectomy: 5-year experience with propensity score matching[J]. Surg Endosc, 2016, 30(11):4785-4792. doi:10.1007/s00464-016-4808-y.
- [13] 杨鹏,朱小朝,陈志峰,等.经腋窝入路免充气腔镜甲状腺手术在中老年患者中的应用价值[J].中国普通外科杂志,2023,32(5):665-672. doi:10.7659/j.issn.1005-6947.2023.05.005.
- Yang P, Zhu XC, Chen ZF, et al. Application value of gasless endoscopic thyroid surgery via axillary approach in middle-aged and elderly patients[J]. China Journal of General Surgery, 2023, 32(5):665-672. doi:10.7659/j.issn.1005-6947.2023.05.005.
- [14] 黄海,陈欣欣,马宇园,等.无充气腋窝入路全腔镜下甲状腺癌根治术的学习曲线分析[J].中国普通外科杂志,2021,30(5):522-530. doi:10.7659/j.issn.1005-6947.2021.05.003.
- Huang H, Chen XX, Ma YY, et al. Analysis of learning curve of complete endoscopic radical thyroidectomy via a gasless axillary approach[J]. China Journal of General Surgery, 2021, 30(5): 522-530. doi:10.7659/j.issn.1005-6947.2021.05.003.
- [15] 陈俊勇,邵子力,韩梦玲,等.经腋窝入路免充气腔镜甲状腺单侧腺叶切除术的学习曲线[J].腹腔镜外科杂志,2022,27(9):667-671. doi:10.13499/j.cnki.fqjwkzz.2022.09.667.
- Chen JY, Shao ZL, Han ML, et al. The learning curve of gasless endoscopic unilateral thyroid lobectomy via axillary approach[J]. Journal of Laparoscopic Surgery, 2022, 27(9): 667-671. doi: 10.13499/j.cnki.fqjwkzz.2022.09.667.
- [16] 蔡颖超,沈祝莘.无充气腋窝入路完全腔镜甲状腺手术护理配合[J].世界最新医学信息文摘,2019,19(8):295-296. doi:10.19613/j.cnki.1671-3141.2019.08.160.
- Cai YC, Sheng ZP. Nursing cooperation of totally endoscopic thyroidectomy via non-inflatable axillary approach[J]. World Latest Medicine Information, 2019, 19(8): 295-296. doi: 10.19613/j.cnki.1671-3141.2019.08.160.
- [17] Wang H, Liu R, Zhang C, et al. Modification and application of "zero-line" incision design in total endoscopic gasless unilateral axillary approach thyroidectomy: a preliminary report[J]. Front Surg, 2023, 10:1121292. doi:10.3389/fsurg.2023.1121292.
- [18] 朱忠健,王慧玲,刘睿,等.以锁骨上窝特殊脂肪组织为标记指引无充气腋窝入路腔镜甲状腺手术的临床效果(附视频)[J].中国普通外科杂志,2023,32(11):1713-1718. doi:10.7659/j.issn.1005-6947.2023.11.010.
- Zhu ZJ, Wang HL, Liu R, et al. Clinical efficacy of endoscopic gasless axillary approach thyroidectomy using distinctive fat tissue in the supraclavicular fossa as a landmark guidance(with video)[J]. China Journal of General Surgery, 2023, 32(11): 1713-1718. doi: 10.7659/j.issn.1005-6947.2023.11.010.
- [19] 孙百慧,余诗桐,葛军娜,等.经腋窝无充气后入路腔镜甲状腺手术的“场景化”辅助操作[J].中国普通外科杂志,2023,32(5):724-730. doi:10.7659/j.issn.1005-6947.2023.05.012.
- Sun BH, Yu ST, Ge JN, et al. "Scene-based" approach for gasless transaxillary posterior endoscopic thyroidectomy[J]. China Journal of General Surgery, 2023, 32(5):724-730. doi:10.7659/j.issn.1005-6947.2023.05.012.
- [20] 中国抗癌协会甲状腺癌专业委员会,中华医学会肿瘤学分会甲状腺肿瘤专业委员会,中国研究型医院学会甲状腺疾病专业委员会,等.无充气腋窝入路腔镜甲状腺手术专家共识(2022版)[J].中华内分泌外科杂志,2021,15(6):557-563. doi:10.3760/cma.j.cn.115807-20211116-00349.
- Chinese Association of Thyroid Oncology, Thyroid Tumor Committee of Oncology Branch of Chinese Medical Association, Thyroid Disease Professional Committee of Chinese Research Hospital Association, et al. Expert consensus on endoscopic thyroidectomy by a gasless unilateral axillary approach (version 2022)[J]. Chinese Journal of Endocrine Surgery, 2021, 15(6):557-563. doi: 10.3760/cma.j.cn.115807-20211116-00349.
- [21] Han BF, Zheng RS, Zeng HM, et al. Cancer incidence and mortality in China, 2022[J]. J Nat Cancer Cent, 2024, 4(1):47-53. doi:10.1016/J.JNCC.2024.01.006.
- [22] Berber E, Bernet V, Fahey TJ 3rd, et al. American thyroid

- association statement on remote-access thyroid surgery[J]. *Thyroid*, 2016, 26(3):331-337. doi:10.1089/thy.2015.0407.
- [23] 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.
- [24] 葛军娜, 魏志刚, 孙百慧, 等. 无充气腋窝入路内镜甲状腺系膜切除术[J]. *中国实用外科杂志*, 2021, 41(12): 1434-1436. doi:10.19538/j.cjps.issn1005-2208.2021.12.25.
- Ge JN, Wei ZG, Sun BH, et al. Endoscopic thyroidectomy via non-inflatable axillary approach[J]. *Chinese Journal of Practical Surgery*, 2021, 41(12): 1434-1436. doi:10.19538/j.cjps.issn1005-2208.2021.12.25.
- [25] 郑子芳, 吴黎敏, 简陈兴, 等. 扶镜手在腔镜甲状腺手术中配合的体会[J]. *中国微创外科杂志*, 2017, 17(8):757-760. doi:10.3969/j.issn.1009-6604.2017.08.024.
- Zheng ZF, Wu LM, Jian CX, et al. Coordination experience of laparoscopic assistant in thyroid surgery[J]. *Chinese Journal of Minimally Invasive Surgery*, 2017, 17(8): 757-760. doi:10.3969/j.issn.1009-6604.2017.08.024.
- [26] 杨净渝, 陈昕. 全腔镜与开放根治术治疗甲状腺微小乳头状癌的比较研究[J]. *中国普通外科杂志*, 2020, 29(7):904-908. doi:10.7659/j.issn.1005-6947.2020.07.016.
- Yang JY, Chen X. Comparative study of total laparoscopic versus open surgery in treatment of papillary thyroid microcarcinoma[J]. *China Journal of General Surgery*, 2020, 29(7): 904-908. doi:10.7659/j.issn.1005-6947.2020.07.016.
- [27] Jantharapattana K, Leelasawatsuk P. Transaxillary endoscopic thyroid lobectomy: gas insufflation versus gasless technique[J]. *Eur Arch Otorhinolaryngol*, 2020, 277(7): 2049-2054. doi:10.1007/s00405-020-05908-w.
- [28] 廖文强, 李勤裕, 袁建明, 等. 免充气腋径路腔镜与传统开放甲状腺手术的疗效对比分析[J]. *外科理论与实践*, 2023, 28(1):83-87. doi:10.16139/j.1007-9610.2023.01.14.
- Liao WQ, Li QY, Yuan JM, et al. Comparative analysis between air-free trans-axillary laparoscopic thyroidectomy and open thyroidectomy[J]. *Journal of Surgery Concepts & Practice*, 2023, 28(1):83-87. doi:10.16139/j.1007-9610.2023.01.14.
- [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] 何高飞, 姜金汐, 褚俊杰, 等. 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[J]. *中国普通外科杂志*, 2023, 32(11):1705-1712. doi:10.7659/j.issn.1005-6947.2023.11.009.
- He GF, Jiang JX, Chu JJ, et al. A video report of a case of gasless endoscopic right thyroid lobectomy with right central lymph node dissection by transsubclavian approach[J]. *China Journal of General Surgery*, 2023, 32(11): 1705-1712. doi:10.7659/j.issn.1005-6947.2023.11.009.

(本文编辑 熊杨)

本文引用格式: 方茜, 游硕, 曾政, 等. 无充气腋窝入路全腔镜下甲状腺切除术的“场景式”扶镜技巧与质量控制[J]. *中国普通外科杂志*, 2024, 33(5):742-752. doi:10.7659/j.issn.1005-6947.2024.05.007

Cite this article as: Fang Q, You S, Zeng Z, et al. "Scene-based" camera-holding skills and quality control for gasless axillary total endoscopic thyroidectomy[J]. *Chin J Gen Surg*, 2024, 33(5):742-752. doi:10.7659/j.issn.1005-6947.2024.05.007