

机器人甲状腺切除术的研究进展

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摘 要

随着微创技术的发展以及在甲癌中的广泛应用, 手术方式也发生着日新月异的变化, 包括各种甲状腺手术入路, 目前最常用的机器人甲状腺手术有经双侧腋乳入路甲状腺机器人切除术(bilateral axillo-breast approach robotic thyroidectomy, BABA-RT)、经口腔前庭入路甲状腺机器人切除术(transoral approach robotic thyroidectomy, TORT)、无气腋窝(单/双切口)入路甲状腺机器人切除术(transaxillary approach/robot-assisted transaxillary thyroidectomy, TAA/RATT)、无气单侧腋窝入路/无气单侧腋乳入路甲状腺机器人切除术(gasless unilateral axillo-breast approach/gasless unilateral transaxillary approach, GUAB/GUA)、耳后入路甲状腺机器人切除术(retroauricular approach robotic thyroidectomy/robotic facelift thyroidectomy, RA-RT/RFT)等。随着临床医生对微创概念的理解、经验积累以及手术器械的改进, 大多数临床医生更愿意尝试机器人手术。本文简要概述甲状腺手术的发展历程以及如今常用入路机器人甲状腺切除术的优势, 有望在不久的将来成为治疗外科甲状腺疾病的主要治疗方式和手段。

关键词

机器人甲状腺切除术, 经双侧腋乳入路, 经口腔前庭入路, 无气腋窝入路, 耳后入路

Research Progress of Robotic Thyroidectomy

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Abstract

With the development of minimally invasive technology and its wide application in thyroid cancer,

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the surgical methods have also undergone rapid changes, including various thyroid surgery approaches. Currently, the most commonly used robotic thyroid surgeries are the bilateral axillary breast approach (BABA-RT), transoral vestibular robotic thyroidectomy (TORT), airless axillary (single/double incision) robotic thyroidectomy (TAA/RATT), airless unilateral axillary approach/Airless unilateral axillary breast approach robotic thyroidectomy (GUAB/GUA), retroauricular approach robotic thyroidectomy (RA-RT/RFT), etc. With clinicians' understanding of minimally invasive concepts, accumulation of experience, and improvements in surgical instruments, most clinicians are more willing to try robotic surgery. This article briefly outlines the development of thyroid surgery and the advantages of robotic thyroidectomy, which is commonly used today, and is expected to become the main treatment modality and surgical segment for surgical thyroid diseases in the near future.

Keywords

Robotic Thyroidectomy, Bilateral Axillary Breast Approach, Oral Vestibular Approach, Airless Axillary Approach, Retroauricular Approach

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1. 甲状腺癌及其手术的发展历程

据统计 2020 年, 全世界甲癌年龄标准化发病率分别为: 女性约为十万分之十; 而男性相对较低为十万分之三。年龄标准化死亡率分别为: 女性约十万分之零点五; 而男性仅有十万分之零点三。相关研究结果表明, 女性的发病率是男性的 3 倍[1], 中国城市户口的女性甲癌的发病率位居女性全部恶性肿瘤的第 4 位, 并将以每年 20% 的速度持续增加[2]。此外, 某些研究认为, 罹患甲癌的病患正在趋向年轻化, 但与其它恶性肿瘤相比, 预后相对较好, 死亡率及复发率较低[3]。由于开放手术术后颈部留有手术瘢痕, 瘢痕较长且位置明显, 这就涉及了较为敏感的美学问题[4], 故而, 我们认为在评估病患的手术结果及其肿瘤的根治性和安全性的同时, 也要相应照顾某些对微创美容有要求的病人群体。

为了满足现代年轻人的要求, 特别是大多数女性病患和对微创美容有要求的病患群体, 以及医疗水平的不断提升和医师技术及经验的不断累积, 才促进了微创技术的蓬勃发展。

甲状腺传统的开放手术最初是 Theodore Kocher (西奥多·科彻) 在 19 世纪末期提出的, 这种方法由于切除后疗效比较显著, 因此至今仍是甲癌的首选治疗方法。随着现代科技的发展, 医疗技术和人们生活水平也相对提高, 应时而生的内窥镜技术逐渐流行开来[5]。内窥镜应用于颈部手术最初是在 1996 年, 在往后的发展中其安全性和可行性方面被临床医师普遍认可。某些研究显示, 应用这种内窥镜微创的方式不管是在外观美容方面、住院时长方面以及术后疼痛程度, 还是在病患恢复到正常生活方面比传统开放手术有更显著的提升[6]。此后, 内窥镜微创技术在国内外迅猛发展, 在满足了部分病人群体对手术疗效及安全方面问题的同时也达到了美观性的要求和目的[7]。

内窥镜的应用的确明显提高了病患对切口的满意度, 但其二维平面视觉特征和无法随意调整操作角度的内窥镜器械, 因此无法快速调整甚至根本不能达到施术者的理想手术角度, 影响内窥镜器械的精细操作和腺体组织的精细解剖, 增加了 VI 区淋巴结清扫难度, 再加上摄像机视觉不平稳导致二维平面可视化的三维深度感知丢失, 而且相对倚赖施术者的操作熟练度等一些缺点。上述内窥镜的缺点迫使微创技

术不得不继续向前发展,以追求更加“完美”的手术器械[8] [9] [10]。

二十一世纪初期, Davinci 机器人(Intuitive Surgical, Inc, Sunnyvale, California)被获批应用在一些腔镜手术领域[11], 其中有普通外科、妇科、小儿外科、泌尿外科等[12]到 2007 年年底, 我国才第一次将胸腔外科及耳鼻咽喉头颈外科 Davinci 机器人手术系统应用到甲状腺外科, 其优点可归纳为以下几点: 1) 它不仅能提供 3D 视角而且较内窥镜更加清晰, 对于需精细操作的结构组织可随意放大; 2) 让施术者更容易达到最佳视角, 且更容易进入深邃狭窄的空间; 3) 其机械臂不仅能提供平稳的视野, 还能减缓施术者的视力疲劳, 降低施术者手抖造成的操纵杆晃动; 4) 其多关节器械可使施术者进行更精密的操作, 使操作更加灵活, 更加精细; 5) 机器人的器械臂完全由施术者掌控, 这降低了在内窥镜下切除腺体时常常出现的经验不足的辅助者引起一系列问题。它消除了腔镜手术只有二维视野、仪器的精准度和灵活度不足、学习曲线较长等弊端[8] [13] [14] [15]。

近些年, 随着微创外科水平的提高和机器人技术被逐渐广泛应用, 手术中使用机器人系统切除甲状腺的外科大夫越来越多。因为, 它不仅满足了施术者稳定且较为清晰的视野, 还达到了可灵活旋转的操作目的, 并且避免了传统手术疤痕。Davinci 机器人迎合了大众对“美”的要求, 但其学习曲线、手术成本和长期手术结果等方面尚存有争议[8]。当然其发展还不足 20 年, 尚未完全成熟的机器人手术是不是真正适合甲状腺外科, 还是个未知数, 还须要进一步的探索[11]。

随着微创手术近些年来的发展, 当前应用最多的手术方式有: 双侧腋窝乳入路机器人甲状腺切除术(bilateral axillo-breast approach robotic thyroidectomy, BABA-RT)、口腔前庭入路机器人甲状腺切除术(transoral approach robotic thyroidectomy, TORT)、无气腋窝(单/双侧切口)入路机器人甲状腺切除术(transaxillary approach/robot-assisted transaxillary thyroidectomy, TAA/RATT)、无气单侧腋窝入路/无气单侧腋窝乳入路机器人甲状腺切除术(gasless unilateral axillo-breast approach/gasless unilateral transaxillary approach, GUAB/GUA)、耳后机器人甲状腺切除术(retroauricular approach robotic thyroidectomy/robotic facelift thyroidectomy, RA-RT/RFT)等[16] [17] [18]。

各种不同手术入路机器人甲状腺切除术的优势总结如下:

1) 腋窝入路优势: ① 该入路手术刀口位置较隐秘, 正常活动时很难暴露, 迎合了大多数病患对“美”的要求[19] [20] [21]; ② 该入路的相机位置和手术器械均在同一侧, 该方法在切除单侧甲状腺腺叶及峡部时较轻松, 另外对同一侧颈部淋巴结清扫也有相当大的优势[22] [23]; ③ 该入路是利用传统手术空间与牵引器辅助吸烟系统相互配合的方法建立手术操作空间, 既能确保术野的清晰度(术中不产生雾), 在一定程度上也降低了手术时长[24] [25]; ④ 因为该入路操作空隙较大, 如有较大的甲状腺病变组织就表现出其优势, 术中易于保持病变组织的完整性, 特别是在甲癌的手术治疗中。

2) 双侧腋 - 乳入路优势: ① 该入路手术刀口位置在皮肤皱纹和色素沉着处, 也极不易被发现。病患康复后随时间推移瘢痕会渐渐淡化, 再加上衣服遮挡、皮肤皱纹和色素沉着, 基本不会有很大的瘢痕(除瘢痕体质病患); ② 该入路与开放手术相同之处在于中线手术的视野和操作方式, 有利于医师学习(学习曲线短) [26] [27], 相关研究阐明了该入路的学习曲线约 30~40 例; ③ 该入路在操作时其机械操作臂间较宽, 这大大降低了机械臂在操作时相互碰撞的窘况, 这在节约了手术时长的同时也降低了机械臂间碰撞, 并且减小了其器械磨损[28]; ④ 该入路依靠器械臂的位置的优势, 能安全、完整的将带状肌和 VI 区淋巴结切除, 有经验的执刀医生可在此基础上完成颈侧区淋巴结清扫[28] [29] [30]; ⑤ 该入路在运用机器人时由于其 4 个臂的位置呈对称分布, 因此, 两侧甲状腺侧叶的切除及淋巴结清扫可采用大致相似的方式进行[27] [31], 这也相应节约了手术时长。

3) 经耳后入路优势: ① 该入路手术刀口位于耳后, 位置也相对隐秘, 其与甲状腺之间相距更近, 手术切取的皮瓣更少, 对软组织损伤更小, 适用于颈部相对短的病患[32] [33], 相关研究显示[34], 其与

腋窝入路相比,经耳后入路的皮瓣分离面小 38%;② 最重要的是,该入路还绕过了臂丛神经的路径,避免了操作器械对神经的损伤[20];③ 该入路运用了更简便的直视侧颈区的手术视角,使甲状腺更容易定位,比其它入路更容易解剖喉返神经[33] [35],间接降低了喉返神经损伤率;④ 该入路在直视侧颈区的视角能清楚的识别出颈部的大血管和肌肉组织[36],很大程度上降低了侧颈区淋巴结清扫的难度,同时也减少了血管和神经的损伤;⑤ 该入路在手术中不用二氧化碳充气来提供操作空间,这也避开了二氧化碳引起的并发症的发生。

4) 经口入路优势:① 该入路手术刀口位置经人体自然腔隙-口腔,手术之后病患的口腔黏膜在六个月内可痊愈,若去除腋窝臂辅助牵引器后,可达到“无疤痕”手术的要求[37] [38] [39];② 该入路是手术刀口至甲状腺距离较短的入路之一[40],其所需皮下剥离面与传统手术剥离面非常相近[26] [38] [41],满足了微创手术的要求;③ 该入路术中机器人的操作臂也大体上对称,摄像机在中央线的位置[41],两侧甲状腺可采用同种方法切除,这就节约了手术时长;④ 该入路在皮瓣剥离方面与其它方式相比更简便,只须贴着下颌骨边缘,就能够成功到达颈阔肌下层[42];⑤ 该入路的操作方式在 VI 淋巴结的清扫方面有相当大的优势[24] [41],不论是在视角,还是在操作臂的活动方面都是最出色的[41]。

2. 总结与前景

机器人甲状腺切除术有以上几种常用手术入路,每种手术入路都有其特殊之处,其适用的病患也有差异,适当的入路可以较好地达到病患的预期,不仅能满足病患的微创治疗要求,也能满足施术者减少创伤及人体的应激反应的目的。除此之外,其并发症也略有不同。全面认识各种入路的并发症可帮助医生更好地应对围术期的病患,也能尽量减少外科手术的发生率以及更明确地向病患及家属阐明手术风险。

伴随近年来科技的快速发展和医疗水平的大幅度改善,更精密的医疗器械(如 Davinci 机器人)相信很快便可大量投入临床外科,届时也必将使其更成熟、安全、可行。这也是推动人类医疗技术和医疗水平向着更微创、更安全的方向发展,也是医疗界的一种“必然选择”,使其能更好地为人类的生命健康服务。

3. 总结及未来展望

机器人甲状腺切除术有多种手术入路,每一种手术入路都有其特别之处,其适用对象也有不同,合适的入路才能更好地满足病患的治疗要求、降低创伤以及机体的应激反应;此外不同入路的并发症也稍有不同,了解这些并发症有助于临床医师在围术期对症处理,尽可能降低发生率以及充分地向病患说明手术风险。

随着科学技术的迅猛发展及医疗水平的不断提高,更精密的医疗设备(达芬奇机器人)在不久的将来一定会被广泛应用到外科手术当中,到时必定会更加成熟,更加安全,更加可行。这也是驱使医疗水平向前发展的必然趋势,也使得其服务于人类,造福于人类,更好地呵护人类的生命健康。

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