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·论著·

# 食管癌根治术患者术后发生下肢深静脉血栓的危险因素及血栓风险评估

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【摘要】**目的**　评估食管癌根治术患者术后的血栓风险,探究患者术后发生下肢深静脉血栓(DVT)的危险因素。**方法**　回顾性分析2020年1月至2021年1月在商洛市中心医院接受食管癌根治术治疗的156例食管癌患者的临床资料,根据DVT发生情况分为DVT组($n$=38)和非DVT组($n$=118),对患者术后发生DVT的相关因素进行单因素分析,再采用多因素Logistic回归分析确定DVT发生的独立危险因素。**结果**　单因素分析结果显示,DVT组患者的年龄大于非DVT组[(67.94±8.48)岁 *vs* (64.25±7.62)岁],差异有统计学意义($P$<0.05),合并糖尿病、心血管疾病、骨折、呼吸道疾病、肝肾疾病、凝血因子功能亢进患者的比例明显高于非DVT组(36.84% *vs* 20.34%、31.58% *vs* 15.25%、26.32% *vs* 12.71%、28.95% *vs* 10.17%、21.05% *vs* 8.47%、52.63% *vs* 26.27%),术中出血量、术后卧床时间、D-二聚体水平明显多(长)于非DVT组[(62.63±12.46) mL *vs* (57.68±10.42) mL、(32.71±5.48) d *vs* (28.63±4.72) d、(6.76±1.04) mg/L *vs* (2.18±0.65) mg/L],差异均有统计学意义($P$<0.05);DVT组患者的Caprini评分为(6.48±2.01)分,明显高于非DVT组的(3.57±1.14)分,差异有统计学意义($P$<0.05),DVT组患者的血栓风险高危险度和极高危险度的总比例为92.10%,明显高于非DVT组的73.73%,差异有统计学意义($P$<0.05);经多因素Logistic回归分析结果显示,年龄、合并呼吸道疾病、肝肾疾病、术后卧床时间、D-二聚体水平和凝血因子功能亢进均是影响食管癌根治术患者术后发生DVT的独立危险因素($P$<0.05)。**结论**　Caprini血栓风险模型能够有效预测食管癌根治术后DVT发生的风险,年龄、呼吸道疾病、肝肾疾病、术后卧床、D-二聚体和凝血因子功能亢进是影响食管癌根治术患者发生DVT的危险因素。

【关键词】食管癌根治术;下肢深静脉血栓;危险因素;风险评估
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**Risk factors of lower extremity deep venous thrombosis and thrombosis risk assessment after radical surgery for esophageal carcinoma.** *YU Fang [1], FAN Cheng-tao [2], BAI Bing [1], WU Su-bin [1]. Department of Oncology [1], Department of Thoracic Surgery [2], Shangluo Central Hospital, Shangluo 726000, Shaanxi, CHINA*

【**Abstract**】 **Objective**　To evaluate the thrombosis risk after radical surgery for esophageal carcinoma, and investigate the risk factors for lower extremity deep venous thrombosis (DVT) after surgery. **Methods**　This study retrospectively analyzed the clinical data of 156 patients who underwent radical surgery for esophageal carcinoma in Shangluo Central Hospital between January 2020 and January 2021. The patients were divided into DVT group ($n$=38) and non-DVT group ($n$=118) according to the presence or absence of DVT. Univariate analysis and multivariate logistic regression analysis were performed to screen the independent risk factors for DVT. **Results**　Univariate analysis results

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showed that patients in the DVT group were significantly older than those in the non-DVT group: (67.94±8.48) years old *vs* (64.25±7.62) years old, *P*<0.05. The proportions of patients with diabetes, cardiovascular disease, fracture, respiratory disease, liver and kidney disease, and hyperfunction of coagulation factors were significantly higher than those in the non-DVT group (*P*<0.05): 36.84% *vs* 20.34%, 31.58% *vs* 15.25%, 26.32% *vs* 12.71%, 28.95% *vs* 10.17%, 21.05% *vs* 8.47%, 52.63% *vs* 26.27%. The intraoperative blood loss, postoperative time in bed, and D-dimer level were more, longer or higher than those of the non-DVT group (*P*<0.05): (62.63±12.46) mL *vs* (57.68±10.42) mL, (32.71±5.48) d *vs* (28.63±4.72) d, (6.76±1.04) mg/L *vs* (2.18±0.65) mg/L. The Caprini score of the DVT group was significantly higher than that of the non-DVT group: (6.48±2.01) *vs* (3.57±1.14), *P*<0.05. The proportion of high risk and extremely high risk of thrombosis in DVT group was significantly higher than that in non-DVT group (92.10% *vs* 73.73%, *P*<0.05). Multivariate logistic regression analysis showed that age, respiratory disease, liver and kidney disease, postoperative time in bed, D-dimer level, and hyperfunction of coagulation factors were independent risk factors for DVT after radical surgery for esophageal carcinoma (*P*<0.05). **Conclusion** The Caprini thrombosis risk model can effectively help to predict the risk of DVT after radical surgery for esophageal carcinoma. Age, respiratory disease, liver and kidney disease, postoperative rest in bed, D-dimer, and hyperfunction of coagulation factors are risk factors for DVT after radical surgery for esophageal carcinoma.

**【Key words】** Radical surgery for esophageal carcinoma; Lower extremity deep venous thrombosis; Risk factor; Risk assessment

食管癌是一类以进食有哽咽感、进行性吞咽困难和持续性胸骨后疼痛为主临床要症状的肿瘤疾病，其发病率位于全部恶性肿瘤的第6位，严重威胁患者的生命健康[1]。当前，临床多采用外科手术治疗，但术后下肢深静脉血栓(DVT)的形成一直是影响食管癌根治术患者预后的主要并发症[2]。有研究报道，食管癌根治术后DVT发生率可达24%，使患者术后死亡率明显升高[3]。因此，明确食管癌根治术后DVT发生的高危因素，并对患者进行分层干预，有利于患者生存质量的提升[4]。本研究探讨了影响食管癌根治术患者发生DVT的危险因素，旨在为临床食管癌根治术患者的管理及DVT预防提供参考。

## 1 资料与方法

1.1 一般资料 回顾性选取2020年1月至2021年1月商洛市中心医院收治的156例食管癌患者为研究对象。纳入标准：(1)均确诊为食管癌[5]；(2)符合手术指征，均接受食管癌根治术治疗；(3)术前下肢血管彩超检查显示无DVT形成；(4)患者性别不限，年龄≥18岁；(5)临床资料完善。排除标准：(1)存在其他恶性肿瘤者；(2)合并血栓疾病、近期服用抗凝药物者；(3)术中更改手术方式患者。DVT诊断标准：(1)临床表现为患侧或健侧突发麻木、疼痛、肿胀等症状，活动后加重，皮下有异物，皮肤温度降低，血栓部位压痛感明显；(2)超声检查显示静脉管腔出现异常信号(低回声或无回声)，生成血栓的管腔难以被探头压闭，腔内血流信号弱或无信号；(3)深静脉造影结果显示脉管腔闭塞或中断，完全被堵塞不显影，造影剂在某一平面受阻[6]。根据术后DVT情况分为DVT组(*n*=38)和非DVT组(*n*=118)。

1.2 研究方法

1.2.1 一般临床资料收集 收集患者的性别、年龄、体质量指数(BMI)、吸烟史、饮酒史、既往疾病史(高脂血症、糖尿病、心血管疾病、高血压、骨折、呼吸道疾病、肝肾疾病)、肿瘤病理类型(鳞癌、非鳞癌)、TNM分期、术中出血量、D-二聚体、手术时间、卧床时间、血栓弹力图(thrombelastography，TEG)指标等。其中，TEG指标包括反应时间(R)、凝固时间(K)和凝固角(Angle)；以R<5 min为凝血因子功能亢进，K<3 min或Angle>72°为纤维蛋白功能亢进，MA>70 mm为血小板功能亢进[7]。

1.2.2 血栓风险评估 应用Caprini血栓风险模型评估，该模型包括既往手术史、病史、实验室检查等因素，对各因素进行赋值，以各因素分值之和为总评分；根据总评分进行危险度分级，其中，0~1分为低危险度，2分为中危险度，3~4分为高危险度。≥5分为极高危险度[8]。

1.3 观察指标 比较两组患者的一般临床资料、Caprini评分和危险度分级。

1.4 统计学方法 应用SPSS20.0软件进行数据统计分析。计量资料符合正态分布，以均数±标准差($\bar{x}\pm s$)表示，组间比较采用独立样本*t*检验；计数资料比较行$\chi^2$检验或Fisher确切概率检验，等级资料比较采用秩和检验；采用多因素Logistic回归分析影响术后DVT发生的因素。以*P*<0.05为差异有统计学意义。

## 2 结果

2.1 两组患者的一般临床资料比较 DVT组患者的年龄大于非DVT组，合并糖尿病、心血管疾病、骨折、呼吸道疾病、肝肾疾病、凝血因子功能亢进的患者比例高于非DVT组，术中出血量、术后卧床时间、D-二聚体水平高于非DVT组，发生凝血因子功能亢进患者比例高于非DVT组，差异均有统计学意义(*P*<0.05)，见表1。

表1　两组患者的一般临床资料比较[例(%)，$\bar{x}\pm s$]

Table 1　Comparison of general clinical data between the two groups of patients [$n$ (%), $\bar{x}\pm s$]

| 指标 | DVT组($n$=38) | 非DVT组($n$=118) | $t/\chi^2/Z$值 | $P$值 |
|---|---|---|---|---|
| 性别 | | | 0.187 | 0.666 |
| 　男性 | 23 (60.53) | 76 (64.41) | | |
| 　女性 | 15 (39.47) | 42 (35.59) | | |
| 年龄(岁) | 67.94±8.48 | 64.25±7.62 | 2.525 | 0.013 |
| BMI (kg/m$^2$) | 22.49±3.27 | 23.17±3.08 | 1.166 | 0.245 |
| 既往疾病史 | | | | |
| 　糖尿病 | 14 (36.84) | 24 (20.34) | 4.249 | 0.039 |
| 　高血压 | 17 (44.74) | 46 (38.98) | 0.395 | 0.530 |
| 　高脂血症 | 10 (26.32) | 28 (23.73) | 0.104 | 0.747 |
| 　心血管疾病 | 12 (31.58) | 18 (15.25) | 1.932 | 0.026 |
| 　骨折 | 10 (26.32) | 15 (12.71) | 3.953 | 0.047 |
| 　呼吸道疾病 | 11 (28.95) | 12 (10.17) | 8.063 | 0.005 |
| 　肝肾疾病 | 8 (21.05) | 10 (8.47) | 4.455 | 0.035 |
| 吸烟史 | 12 (31.58) | 26 (22.03) | 1.421 | 0.233 |
| 饮酒史 | 15 (39.47) | 29 (24.58) | 3.150 | 0.076 |
| 肿瘤病理类型 | | | 0.417 | 0.518 |
| 　鳞癌 | 35 (92.11) | 112 (94.92) | | |
| 　非鳞癌 | 3 (7.89) | 6 (5.08) | | |
| TNM分期 | | | 1.526 | 0.466 |
| 　Ⅰ期 | 12 (31.58) | 36 (30.51) | | |
| 　Ⅱ期 | 17 (44.74) | 51 (43.22) | | |
| 　Ⅲ期 | 9 (23.68) | 31 (26.27) | | |
| 手术时间 | 226.78±11.53 | 230.61±10.31 | 1.429 | 0.155 |
| 术中出血量(mL) | 62.63±12.46 | 57.68±10.42 | 2.425 | 0.017 |
| 术后卧床时间(d) | 32.71±5.48 | 28.63±4.72 | 4.452 | 0.001 |
| D-二聚体(mg/L) | 6.76±1.04 | 2.18±0.65 | 32.218 | 0.001 |
| TEG指标 | | | | |
| 　凝血因子功能亢进 | 20 (52.63) | 31 (26.27) | 9.077 | 0.003 |
| 　纤维蛋白功能亢进 | 6 (15.79) | 10 (8.47) | – | 0.222[a] |
| 　血小板功能亢进 | 7 (18.42) | 11 (9.32) | – | 0.147[a] |

注：[a]行Fisher确切概率检验。

Note: [a] Fisher exact probability test.

2.2　两组患者的Caprini评分和危险度分级比较　DVT组患者的Caprini评分明显高于非DVT组，血栓风险高危险度和极高危险度的总比例明显高于非DVT组，差异均有统计学意义($P$<0.05)，见表2。

表2　两组患者Caprini评分和危险度分级比较[例(%)，$\bar{x}\pm s$]

Table 2　Comparison of Caprini score and risk classification between the two groups of patients [$n$ (%), $\bar{x}\pm s$]

| 组别 | 例数 | Caprini评分(分) | 危险度分级 | | | |
|---|---|---|---|---|---|---|
| | | | 低危险度 | 中危险度 | 高危险度 | 极高危险度 |
| DVT组 | 38 | 6.48±2.01 | 2 (2.63) | 2 (5.26) | 13 (34.21) | 22 (57.89) |
| 非DVT组 | 118 | 3.57±1.14 | 2 (1.69) | 29 (24.58) | 67 (56.78) | 20 (16.95) |
| $t/Z$值 | | 11.149 | | 17.657 | | |
| $P$值 | | 0.001 | | 0.001 | | |

2.3　影响术后DVT发生的因素　经多因素Logistic回归分析结果显示，年龄、呼吸道疾病、肝肾疾病、术后卧床时间、D-二聚体和凝血因子功能亢进是术后发生DVT的危险因素($P$<0.05)，见表3。

表3　影响术后DVT发生因素的多因素Logistic回归分析

Table 3　Multivariate logistic regression analysis of factors affecting postoperative DVT

| 因素 | $\beta$ | SE | Wald $\chi^2$ | OR | 95%CI | $P$值 |
|---|---|---|---|---|---|---|
| 年龄 | 0.872 | 0.346 | 6.352 | 2.392 | 1.214~4.712 | 0.012 |
| 呼吸道疾病 | 1.426 | 0.297 | 23.053 | 4.162 | 2.325~7.449 | 0.001 |
| 肝肾疾病 | 0.467 | 0.203 | 5.292 | 1.595 | 1.072~2.375 | 0.022 |
| 术后卧床时间 | 0.572 | 0.276 | 4.295 | 1.772 | 1.032~3.043 | 0.039 |
| D-二聚体 | 0.063 | 0.017 | 13.734 | 1.065 | 1.030~1.101 | 0.001 |
| 凝血因子功能亢进 | 0.074 | 0.013 | 32.402 | 1.077 | 1.050~1.105 | 0.001 |

## 3　讨论

DVT是食管癌根治术较为严重的术后并发症之一，但在形成早期无明显体征，极易被忽视。DVT不仅会影响患者术后肢体运动功能的恢复，还可造成肺动脉栓塞，不利于患者疾病恢复[9]。因此，对食管癌根治术患者进行DVT风险评估，是降低术后DVT发生风险的关键。

本研究发现，高龄、合并呼吸道疾病、肝肾疾病、术后卧床时间较长、D-二聚体水平偏高和凝血因子功能亢进是影响食管癌根治术患者发生DVT的危险因素。相关研究表明，高龄是DVT发生的危险因素，60岁以上的患者发生DVT的概率要远远高于60岁以下的患者，且随着年龄的增加，患者DVT的发生风险也随之增加[10]。这主要与高龄患者多合并基础疾病，器官功能出现退化，血液动力学发生变化影响血液状态有关。合并呼吸道疾病、肝肾疾病的患者因重要脏器功能不全，会影响日常自主活动，导致血流速度减慢，从而增加术后DVT的发生风险。李海燕等[11]的研究结果显示，合并呼吸道疾病、肝肾疾病患者的静脉血栓栓塞症发生风险较普通患者更高。食管癌根治术患者术后需要保持较长时间的卧床休息，患者下床活动时间得不到保证，肌肉收缩功能减弱，影响血液回流，进而加速血栓形成[12]。因此，术后卧床时间过长也会增加术后DVT的发生风险。D-二聚体是血栓形成的非特异性标志物，对D-二聚体水平变化进行监测可有效反映机体的凝血状态，但有研究认为，D-二聚体水平监测在评估DVT的形成过程中在特异性低和滞后性等不足，无法动态评估血栓形成过程[13]。TEG检测能够动态反映患者整个凝血过程的血凝块形成速率、强度和纤溶水平，在术后早期DVT风险评估方面，效果优于常规检测手段[14]。本研究中，D-二聚体水平和凝血因子功能亢进也是影响患者术后发生DVT的独立危险因素，分析其原因可能是：D-二聚体水平升高、凝血因子功能亢进是患者血液高凝的表现，此时患者血液中促凝物质增多，纤维蛋白溶解系统活性降低，交联纤维蛋白形成增多，沉积于血管内壁后，形成微血栓[15]。

Caprini模型在外科手术患者术后血栓风险评估

中已得到很好验证。本研究结果显示，两组患者的Caprini评分和危险度分级存在明显差异，提示Caprini血栓风险模型在食管癌根治术患者中也适用，对患者术后DVT发生风险有较好的预测性。因此，临床应重视食管癌根治术患者的血栓风险评估，对于极高危险度患者应加强初级预防，并制定相关治疗方案。

综上所述，Caprini血栓风险模型能够有效预测食管癌根治术后DVT发生的风险，食管癌根治术患者发生DVT的风险因素包括年龄、呼吸道疾病、肝肾疾病、术后卧床时间、D-二聚体和凝血因子功能亢进。

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