

## . 个案报道 .

# 复合手术治疗急性进展性硬膜外血肿 1 例

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**【摘要】**急性硬膜外血肿是神经外科常见急重症之一,具有起病急、病情发展迅速、致残率高等特点。尽管目前开颅手术及钻孔引流术等常见手术方式能有效清除血肿,但仍有部分病人由于缺乏针对责任血管的处理,导致血肿继续进展、病情恶化。本文报道 1 例 75 岁女性,因交通事故致意识障碍 3 h 入院,颅脑 CT 示右侧颞顶部急性硬膜外血肿,血肿量约 28 ml。拟行介入栓塞控制出血,二期行钻孔引流术。在导管室完成股动脉穿刺后,突发右侧瞳孔渐散大至 5 mm,考虑进展性血肿增大导致小脑幕切迹疝形成。立即行 Dyna-CT 确认血肿迅速扩大,随即行硬通道穿刺血肿,抽吸出 65 ml 活动性出血;造影见右侧脑膜中动脉后支造影剂外溢,证实破裂活动性出血,予以 Onyx 胶栓塞后即刻造影见出血停止。Dyna-CT 引导下于右侧颞枕部再次穿刺抽吸出 205 ml 血液。之后行开颅手术,取右侧颞顶枕部马蹄形切口,铣开约 12 cm×10 cm 骨窗,清除硬膜外血肿约 80 ml;放射状剪开硬膜后,清除硬膜下血肿约 20 ml,同时去除骨瓣。术后 1 d 复查 CT 示血肿基本清除,未见新发血肿。术后 8 个月随访,GCS 评分 15 分,右侧肢体肌力 V 级,左上肢肌力 0 级,左下肢肌力 III 级。因此,对于急性硬膜外血肿,应准确判断血肿的部位、性质、出血来源和进展速度,充分了解各种治疗方法的优缺点,及时选择恰当的治疗方法,制定个体化的治疗方案,才能获得良好的治疗结果。

**【关键词】**急性硬膜外血肿;进展性硬膜外血肿;复合手术;血管内治疗;钻孔引流术;开颅血肿清除术

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### Hybrid surgery for a patient with an acute progressive extraparenchymal hematoma

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**【Abstract】** Acute epidural hematoma is one of the common and critical conditions in neurosurgery, characterized by sudden onset, rapid progression of symptoms, and high rate of disability. Although common surgical procedures such as craniotomy and burr hole drainage can effectively remove the hematoma, some patients still suffer from progression of the hematoma and deterioration of their condition due to lack of treatment for the responsible blood vessel. This paper reported a 75-year-old female who was admitted to the hospital with a 3-hour history of loss of consciousness due to a traffic accident. CT scan revealed an acute epidural hematoma that overlies the right frontal and parietal lobes, with a volume of approximately 28 ml. The patient was planned to undergo interventional embolization to control the bleeding and a second operation for burr hole drainage. After femoral artery puncture in the angiography room, the patient's right pupil gradually dilated to 5 mm, which was considered to be the progression of the hematoma causing a herniation. A Dyna-CT scan confirmed the rapid expansion of the hematoma, and a volume of 65 ml hematoma was immediately drained. Angiography revealed that the distal branches of the right middle meningeal artery (MMA) were leaking contrast agent, confirming its rupture and active bleeding, which was treated with Onyx glue embolization. Dyna-CT-guided puncture and drainage of 205 ml of blood was performed after the embolization. Subsequently, a craniotomy was performed, with a right temporal-parietal-occipital horseshoe-shaped incision and a 12 cm × 10 cm bone window, and approximately 80 ml of subdural hematoma was removed. Radial incision of the dura mater was performed afterward, and approximately 20 ml of subdural hematoma was removed. Then the bone flap was removed. One day after the craniotomy, CT scan showed that the hematoma had been mostly removed, and no new hematoma was found. At the 8-month follow-up, the GCS score was 15, and the right limb had a muscle strength of grade V, while the left upper limb had a muscle strength of 0 and the left lower limb had a muscle strength of grade III. Therefore, for acute epidural hematoma, it is important to accurately determine the location, nature, source of bleeding, and progression of the hematoma, fully understand the advantages and disadvantages of various treatment methods, and choose an appropriate treatment method in a timely manner to develop an individualized treatment plan, in order to achieve good treatment outcomes.

**【Key words】** Acute epidural hematoma; Progressive extraparenchymal hematoma; Hybrid surgery

急性硬膜外血肿(acute epidural hematoma, AEDH)约占颅内血肿的 30%,其中 85%的出血源于颅内动脉<sup>[1]</sup>,最常见于外伤后颅骨内板与硬脑膜分离移位所致脑膜中动脉(middle meningeal artery, MMA)破裂出血。目前,AEDH 有钻孔引流术、小骨瓣开颅术、阶梯降压术等手术方式,但伤后小型血肿

再增大的几率在 0.35%~23%<sup>[2]</sup>,由此演变而来的迟发性硬膜外血肿(delayed epidural hematoma, DEDH)病死率在 25%~48%<sup>[3]</sup>,原因在于对小型血肿的出血来源缺乏针对性治疗,部分病人可出现进行性出血,导致病情迅速恶化。本文报道 1 例因 MMA 进行性出血导致进展性硬膜外血肿(progressive epidural hematoma, PEDH),经复合手术处理救治成功。

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### 1 病例资料

75 岁女性,因交通事故致意识障碍 3 h 于 2022 年 4 月 3

日入院。既往高血压病史40年,糖尿病史10年。入院体格检查:脉搏80次/min,血压160/90 mmHg;意识恍惚,检查欠合作;GCS评分10分;双侧瞳孔等大、等圆,直径2.5 mm,对光反射迟钝;肌力查体不合作,肌张力正常。颅脑CT示右侧颞顶部AEDH,血肿量约28 ml(图2a)。拟行介入栓塞控制出血,二期行钻孔引流术。导管室完成股动脉穿刺后,突发右侧瞳孔渐散大至5 mm,对光反应消失,考虑进展性血肿增大导致小脑幕切迹疝形成,立即行Dyna-CT确认血肿迅速扩大(图2b),随即行硬通道穿刺血肿,抽吸出65 ml活动性出血,瞳孔随即回缩。随即造影见右侧MMA后支造影剂外溢,证实其破裂活动性出血,经Echelon-10微导管超选择造影确认位置后予Onyx胶栓塞,即刻造影见出血停止(图1)。Dyna-CT引导下于右侧颞枕部穿刺缓慢抽吸110 ml新鲜血液,行Dyna-CT见仍存在大量血肿,继续抽出约95 ml,抽吸总出血量270 ml。术后复查Dyna-CT见血肿较前缩小(图2c),遂行开颅手术。取右侧颞顶枕部马蹄形切口,翻开皮瓣见右侧颞骨骨折线向顶枕部延伸约13 cm,铣开约12 cm×10 cm骨窗,清除硬膜外血肿约80 ml,可见脑膜中动脉破裂口及近端有Onyx胶

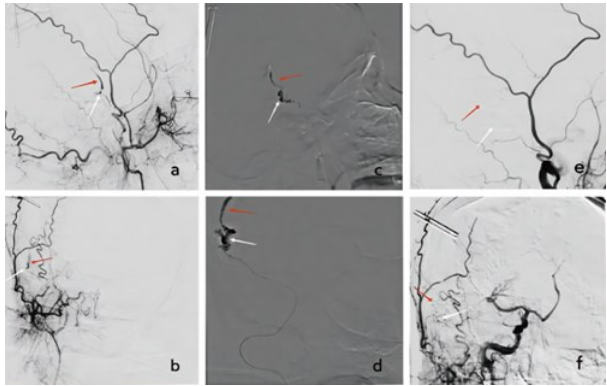


图1 右侧颞顶部急性进展性硬膜外血肿脑膜中动脉栓塞前后DSA  
a、b. 右侧颈外动脉造影显示右侧脑膜中动脉分支远端造影剂外溢(红色↑示外溢造影剂,白色↑示脑膜中动脉分支破裂口);c、d. 脑膜中动脉分支内超选择造影,红色↑示外溢造影剂,白色↑示脑膜中动脉分支破裂口;e、f. 栓塞后即刻造影见造影剂停止外溢,红色↑示原造影剂外溢处,白色↑示原脑膜中动脉分支破裂口

**Figure 1 Pre- and post-operative DSA of a patient with an acute progressive epidural hematoma that overlies the right frontal and parietal lobes underwent embolization of the right middle meningeal artery (MMA)**  
a-b: Right external carotid artery angiography shows the extrusion of contrast agent from the distal branches of the right MMA, with red arrow indicating the extrusion of contrast agent, and white arrow indicating the rupture of the branches of the MMA. c-d: Selective angiography of the branches of the right MMA shows the extrusion of contrast agent (red arrow), and the rupture of the branches of the right MMA. e-f: Angiography immediately after embolization shows no leakage of the contrast agent, with red arrow indicating the original site of contrast agent leakage, and white arrow indicating the original site of MMA branch rupture.

(图2f),并见内侧骨折线沿脑膜中动脉沟向下延伸。放射状剪开硬膜后,清除硬膜下血肿约20 ml,去除骨瓣。术后双侧瞳孔等大、等圆,直径2.5 mm,对光反射灵敏。术后1 d复查CT见血肿基本清除,未见新发血肿(图2d)。予以输血、抗感染、脑脊液置换等治疗后意识逐渐好转,术后7 d呼唤睁眼。术后2个月复查CT见血肿完全吸收(图2e),转入康复科继续治疗。术后8个月随访,神志清楚,能简单对答,GCS评分15分,右侧肢体活动良好,肌力约V级;左上肢肌力0级,左下肢肌力Ⅲ级。

2 讨论

对AEDH,常用的治疗方法为开颅手术清除血肿或/和钻孔引流术。尽管积极的手术可清除血肿,但对于进行性出血,由于缺乏针对出血来源的治疗手段,往往只能观察等待,仍然有DEDH形成的危险,尤其以MMA破裂最为常见,极少数甚至有MMA假性动脉瘤形成的可能。Kim等<sup>[4]</sup>报道1例交通事故后AEDH,入院后神经功能迅速恶化,CT证实血肿量增大,遂急诊开颅手术,术中由于脑肿胀及术野模糊始终无法确定出血来源,行DSA才发现MMA大型假性动脉瘤并伴大量造影剂外渗,通过血管内栓塞MMA获得有效止血并完

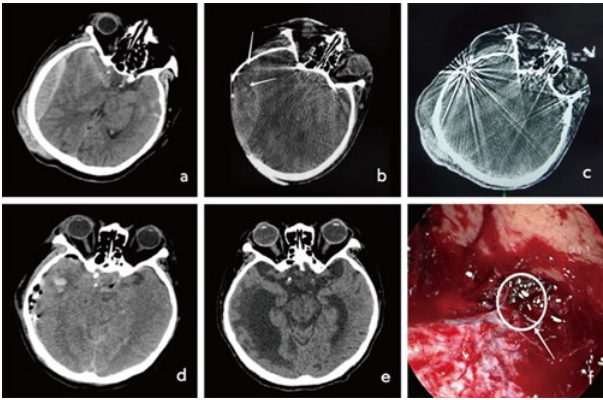


图2 右侧颞顶部急性进展性硬膜外血肿脑膜开颅手术前后影像学表现及术中表现  
a. 入院时颅脑CT显示右侧颞顶部硬膜外血肿,血肿量约28 ml;b. 导管室首次Dyna-CT显示右侧颞顶部血肿明显进展,血肿内见“漩涡征”、“混合征”(↑示);c. 钻孔引流术后行Dyna-CT显示血肿缩小;d. 开颅术后1 d复查CT显示血肿基本清除、散在脑挫裂伤;e. 开颅术后2个月复查CT示血肿完全吸收;f. 开颅术中神经内镜下观察脑膜中动脉破裂口及Onyx胶

**Figure 2 Pre- and post-operative images of a patient with an acute progressive epidural hematoma that overlies the right frontal and parietal lobes underwent a craniotomy**  
a: Preoperative head CT scan shows an epidural hematoma that overlies the right frontal and parietal lobes, with a blood volume of approximately 28 ml. b: The first Dyna-CT scan in the DSA room shows obvious progression of the hematoma, with the "vortex sign" and "mixed sign" (↑ indicates). c: After drilling and suctioning the hematoma, the Dyna-CT scan shows a reduction in the hematoma. d: CT scan 1 day after the craniotomy shows the hematoma mostly removed, with scattered contusions. e: CT scan 2 months after the craniotomy shows disappearance of the hematoma. f: Endoscopic observation of the rupture of the branches of the right middle meningeal artery and Onyx glue during the craniotomy.

成手术。Zussman 等<sup>[5]</sup>对 1 例双侧 AEDH 进行单侧开颅血肿清除术,术后 CT 示对侧血肿体积增大,随即行 DSA 明确 MMA 破裂为血肿进展来源,行血管内栓塞术,术后 CT 显示血肿无继续增大并于 3 个月后完全吸收。Zhang 等<sup>[1]</sup>采用介入栓塞结合颅骨钻孔引流术方法治疗 23 例 AEDH,术中均发现 MMA 活动性出血,将其栓塞后钻孔引流,不仅可以发现并去除出血因素,还能解除占位效应,有效防止血肿复发。Peres 等<sup>[6]</sup>报道血管内治疗 80 例 AEDH,其中 58 例术中见活动性造影剂外溢,采取 MMA 栓塞术,术后血肿未见扩大,无需进一步手术清除血肿。近年来,Park 等<sup>[7]</sup>CT 证实 2 例进展性硬膜外血肿,经 MMA 进行血管内栓塞治疗,有效防止了血肿的继续扩大。因此,针对血肿量小而不能保证血肿体积稳定的病人,行 DSA 明确出血来源后通过栓塞彻底止血是更为合适的选择。本文病例入院时血肿量无绝对开颅手术指征,决定行血管内介入栓塞止血,待出血控制后二期行钻孔引流术,以避免开颅手术,然而栓塞前发现出血量明显增加、脑疝形成,考虑病情发展迅速,立即钻孔抽吸缓解颅内压增高;此时,相较于开颅减压手术,钻孔引流术更具有简便、耗时少、减压快的明显优点,但由于术后残留血肿量大(约 80 ml),考虑 MMA 并非血肿唯一出血来源,故仍需积极手术清除血肿。

本文病例利用复合手术的方式对进展性增大的血肿进行了有效的救治,总结经验如下:①对于 AEDH,DSA 可及时发现出血动脉并有效进行血管内治疗,封堵出血血管,控制血肿的进行性增大。本文病例造影发现出血动脉后即刻予以栓塞,耗时少、安全性高、止血效果良好。②复合手术室中血管造影机可进行术中头颅 CT 扫描,及时发现颅内动态变化,行针对性治疗,虽然与常规 CT 相比效果较差,但对于颅内血肿的显示准确度已足够满足临床需要。③AEDH 进行性出血可能非常迅速,而精准的钻孔抽吸可迅速降低颅内压,赢得开颅手术时间。本文病例硬通道钻孔引流仅需数分钟时间,先后抽吸出血量共计 270 ml,快速降低了颅内压。④AEDH 出血来源除了 MMA 外,还有可能来源于静脉窦、板障、蛛网膜下腔颗粒等处,本文病例虽抽吸出大量活动性出血,但残留大量血肿仍需开颅手术减压。这也说明 MMA 的栓塞治疗仍有一定局限性,对于其它出血来源形成的血肿仍可能需要开颅手术。⑤对于较小的非进展性 AEDH,可通过及时的 DSA 和栓塞出血的 MMA,待血肿液化后再进行钻孔引流术,从而在减少创伤的前提下达到良好的治疗效果。

综上所述,对于 AEDH,应准确判断血肿的部位、性质、出

血来源和进展速度,充分了解各种治疗方法的优缺点,及时选择恰当的治疗方法,制定个体化的治疗方案,才能获得良好的治疗结果。

**【利益冲突声明】:**本文不存在任何利益冲突。  
**【作者贡献声明】:**刘成云收集病例资料、撰写文章;向欣负责审校、修改;杨华提出指导意见;徐源、彭瀚参与临床治疗、随访;周兴旺参与图片的选择与制作。

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