

儿童鞘膜积液发病机制的临床研究

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【摘要】 目的 传统观念认为,儿童非交通性鞘膜积液患儿内环口处鞘状突均处于闭合状态,鞘膜囊内液体主要来源于囊壁自身分泌。本研究旨在探讨儿童先天性鞘膜积液(尤其非交通性鞘膜积液)的发病机制。**方法** 2002年1月至2015年12月由本院收治395例年龄大于2岁先天性鞘膜积液患儿,其中交通性鞘膜积液134例,非交通性鞘膜积液261例;均予腹腔镜手术探查,了解鞘状突闭合情况,术后长期随访鞘状突结扎后疗效;对其中25例接受腹腔镜手术的患儿通过在内环口水平向未闭合的鞘状突内滴注美兰液,了解鞘膜积液的液体可能来源。同期选择传统开放手术患儿34例,术中切除少许鞘膜囊囊壁组织送病理检查,了解囊壁的组织学特征。**结果** ①34例开放手术患儿组织病理学检查发现:患儿鞘膜囊壁内膜主要由单层扁平间皮细胞构成,分泌功能非常弱。②134例交通性鞘膜积液患儿内环口处鞘状突均未闭合,经2~3 cm的鞘状突管直接连通睾丸鞘膜腔,挤压阴囊鞘膜囊可见清亮液体经内环口流入腹腔;261例非交通性鞘膜积液患儿内环口处鞘状突仍呈开放状态,经鞘状突管与精索或睾丸鞘膜囊腔相连,挤压鞘膜囊可见少量液体从其顶部小孔渗出。经内环口向未闭合鞘状突管滴注美兰液,30 min后用细针经皮穿刺交通性和非交通性鞘膜积液囊,均可抽取美兰淡染囊液。③395例腹腔镜下手术患儿,术后平均随访时间均超过1年,仅6例于术后1~3个月患侧复发,一期治愈率98.5%。**结论** 与传统观念不同,本研究发现鞘状突发育过程中未闭合是儿童先天性鞘膜积液发病的主要因素,鞘膜囊壁内膜主要由单层扁平间皮细胞构成,囊内积液不是囊壁自身分泌,而是来源于腹腔的正常腹水。非交通性鞘膜积液鞘膜囊顶部小孔处可能存在单向瓣膜样结构,阻止囊内液倒流入腹腔。

【关键词】 睾丸鞘膜积液;腹腔镜;发病机制;儿童

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【Abstract】 Objective Pediatric processus vaginalis of uncommunicating hydrocele is perceived to stay in a closed state at inner ring and fluid in sac is derived from the secretion of sac wall itself. The present study was intended to explore the possible pathogenesis of congenital hydrocele (esp. uncommunicating hydrocele). **Methods** Between January 2002 and December 2015, 395 boys aged >2 years with congenital hydrocele underwent laparoscopy for exploring the closure of sheath of inguinal inner ring. Within the same period, 34 patients voluntarily opting for traditional open surgery were selected for histological study to investigate the structure of cyst wall. Then methylthionine chloride was injected into processus vaginalis of 25 laparoscopic patients to understand the possible source of fluid in congenital hydrocele. After mini-invasive laparoscopic high-ligations of processus vaginalis at internal inguinal ring, percutaneous puncture, aspiration of sac and postoperative follow-ups were performed for evaluating the therapeutic efficacies. **Results** Pathological research of 34 patients with open surgery revealed that sac of hydrocele was composed predominantly of a monolayer of flat epithelial cells and secretion function was rather weak. According to the changes in cyst size in 395 laparoscopic patients, the preoperative diagnosis was communicating hydrocele ($n=134$) and uncommunicating hydrocele ($n=261$). Under laparoscope, open processus vaginalis with communicating hydrocele was observed at internal inguinal ring. Processus vaginalis communicated with cavity of periorchium by a tube of 2-3 cm. Transparent liquids flew into peritoneal cavity through internal inguinal ring when pressing sac of hydrocele; For 261 pa-

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tients with uncommunicating hydrocele, open processus vaginalis was observed at internal inguinal ring. Processus vaginalis communicated with sac of uncommunicating hydrocele by a tube. A small amount of liquid exuded through connecting hole in sac roof of hydrocele when pressing sac of hydrocele. After an injection of methylthionine chloride into open processus vaginalis, methylthionine chloride was aspirated by a puncture in communicating hydrocele or uncommunicating hydrocele 30 min later. The postoperative mean follow-up of 395 children was over 1 year after laparoscopic high ligation of sheath. Only 6 children had the postoperative unilateral recurrence rate of 1–3 months and a curative rate of 98.5%. **Conclusion** In contrast to the traditional concept, the developmental failure of closure of processus vaginalis is a major pathogenic factor for congenital hydrocele. Sac of hydrocele is composed predominantly of a monolayer flat epithelial cells. And capsular fluid is not secreted by wall itself but derived from normal ascites of abdominal cavity. One-way valve structure may exist in connecting hole in sac roof of hydrocele and it prevents a reflux of liquid into peritoneal cavity.

【Key words】 Testicular Hydrocele; Laparoscopes; Pathogenesis; Child

鞘膜积液是婴幼儿时期常见疾病之一,男性在胚胎时期,睾丸从腹膜后沿腹股沟管下降,于是在内环口处出现一个开放的环,当睾丸下降至阴囊底后,鞘状突闭塞消失成纤维索,从而阻止腹腔内液体和器官进入腹股沟管或者阴囊。如果出生后鞘状突仍没有闭塞,则称为鞘状突未闭,与腹股沟斜疝和鞘膜积液的发病机制有直接关联。传统观念认为:当鞘状突管腔较小,只能允许液体进出时,则为交通性鞘膜积液(communicating hydrocele, CH);当鞘状突近端呈完全闭塞状态为非交通性鞘膜积液(uncommunicating hydrocele, UCH),其囊内液体来源于鞘状突囊壁的自身分泌^[1,2]。随着腹腔镜技术的推广,有学者发现部分 UCH 的内环口也未闭合,这与传统观点相矛盾^[3,4]。基于此,本研究选取 2002 年 1 月至 2015 年 12 月由本院收治的 429 例先天性鞘膜积液患儿为研究对象,其中 395 例经腹腔镜在内环口水平高位鞘状突结扎手术,34 例行传统开放手术,旨在探讨儿童鞘膜积液的发病机制,重点探讨该病鞘状突的闭合情况及鞘膜囊液的来源。

材料与方法

一、临床资料

2002 年 1 月至 2015 年 12 月,共 429 例年龄大于 2 岁的男性鞘膜积液患儿入院手术治疗。根据患儿父母描述的鞘膜囊体积变化情况,结合超声检查,最终由两名工作年限超过 5 年的小儿外科医生确诊为交通性或者非交通性鞘膜积液。根据家长自愿原则,其中 34 例实施传统开放手术,395 例实施腹腔镜手术。

二、病理切片 HE 染色

病理标本来源于同时期 34 例选择传统开放手术的患儿,21 例非交通性鞘膜积液,13 例交通性鞘膜积液。术中切取 0.5 cm × 0.5 cm 的鞘膜囊壁进行 HE 染色。HE 染色步骤如下:

1. 将切取的鞘膜囊壁组织置入 4% 多聚甲醛溶液中,经过固定、脱水、浸蜡、包埋后,制作成石蜡标本块。

2. 将石蜡切片置于 40℃ 烘箱内烘烤过夜。

3. 取出切片冷却至室温

①将切片分别置于二甲苯 I、II 中,各浸泡 10 min。

②将切片分别置于 100%、90%、80%、75% 梯度酒精中各 1 min,水化后用蒸馏水冲洗 2 次,每次 5 min。

③将切片用苏木素染色 2 min,放入 1% 盐酸酒精内分色 5~10 min,流水冲洗 10 min 反蓝。

④将切片分别置于 75%、80%、90%、100% 梯度酒精中脱水,然后置入二甲苯中透明 3 min。

4. 用中性树脂封片。

最后由病理科资深医生经显微镜下观察后确定病理组织类型。

三、腹腔镜下探查并行亚甲蓝实验

所有患儿接受腹腔镜辅助下“鞘状突高位结扎+经皮鞘膜囊肿穿刺抽液”手术,术后随访时间均超过 1 年,最长达 15 年。

患儿全麻下仰卧位,臀部略抬升 20°。沿脐切口入路建立气腹(气腹压:8~10 mmHg),置入 5 mm 30°腹腔镜。首先,腹腔镜直视下探查双侧内环口闭合情况。确认内环口处鞘状突管未闭合后,将腹腔镜镜头经开放的内环口在鞘状突管腔内逐渐深入,观察鞘状突管内形态学结构。前期 10 例交通性和 15 例非交通性鞘膜积液患者,经未闭合的内环口处

向鞘状突管内滴注美兰液,30 min 后用细针经皮穿刺抽取鞘膜积液;在鞘膜积液的囊内注射美兰液,挤压鞘膜囊,观察内环口处是否有淡染蓝色液体流出。395 例患儿均行腹腔镜辅助下鞘状突高位结扎术,同时行经皮细针穿刺抽尽鞘膜囊内积液。

四、术后随访

对 34 例行传统开放手术和 395 例行腹腔镜辅助下“鞘状突高位结扎 + 经皮鞘膜囊肿穿刺抽液”手术的患儿术后随访 1 年以上,随访内容主要为患侧阴囊是否再次出现肿块。

结 果

一、HE 染色结果

光镜下观察发现鞘膜囊壁内膜主要由单层扁平间皮细胞构成,深部为纤维结缔组织构成,其内有血管、淋巴管、成纤维细胞等(图 1),没有发现明显的分泌腺体存在。

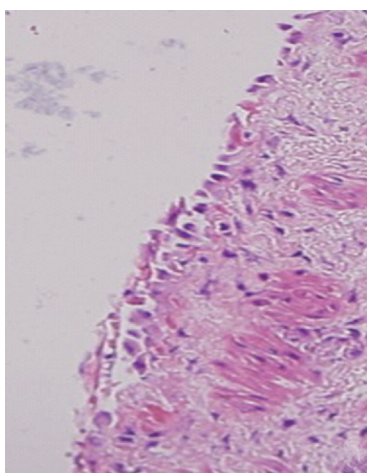


图 1 箭头所指为单层扁平上皮细胞

Fig. 1 Arrow head pointed at monolayer flat epithelial cells

二、腹腔镜探查及实验结果

腹腔镜下探查发现:①134 例 CH 患儿内环口未闭合,有一 2~3 cm 长的管道连通腹腔与鞘膜积液囊腔,挤压鞘膜囊,可见清亮液体自内环口流出;②261 例 UCH 患儿内环口没有闭合(图 2A),鞘膜囊腔通过开放的鞘状突管与腹腔相连。两者的区别如下:UCH 鞘膜囊通过其顶部细小的孔道(直径约 1 mm)连通鞘状突管。挤压鞘膜囊,该小孔表面可见膜状鼓起,微量液体从该小孔渗出(图 2B)。其中 10 例 CH 和 15 例 UCH 患儿,通过未闭合的内环口处向鞘状突管内滴注美兰液,30 mins 后用细针经皮穿刺鞘膜囊,均可抽取美兰淡染囊液,但交通性者蓝染更加明显。向非交通性者的鞘膜囊内直

接注射美兰液,挤压鞘膜囊,可见深蓝染的液体从囊壁顶端的小孔溢出。

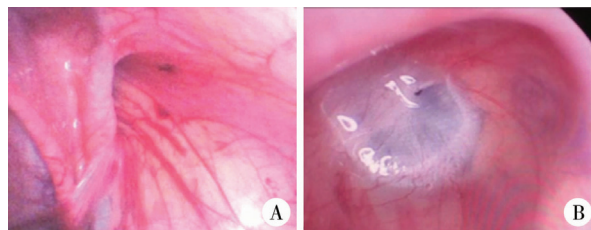


图 2 术中图片。A:腹腔镜探查发现内环口未闭;B:囊膜顶部的微小孔道

Fig. 2 Intraoperative picture. A: Laparoscopic detection of non-closed internal inguinal ring; B: A tiny pore at the top of capsule.

三、随访结果

34 例开放手术患儿中,7 例术后 1 周内阴囊水肿明显,均自愈,无其他明显并发症,随访期间无一例复发。395 例腹腔镜辅助下“鞘状突高位结扎 + 经皮鞘膜囊肿穿刺抽液”手术患儿术后随访期间,6 例于术后 1~3 个月超声检查提示鞘膜囊内少量积液,其余术后均恢复良好,一期治愈率 98.5%。6 例复发患儿均没有再行手术,仅经皮穿刺抽液 1~2 次,术后 1 年超声复查均无明显积液,二期治愈率 100%。

讨 论

鞘状突发育过程中未闭合通常被认为与儿童腹股沟斜疝和鞘膜积液的发病机制有直接关联^[5]。传统观念将儿童鞘膜积液分为交通性和非交通性两大类,认为非交通性鞘膜积液的上端鞘状突已经完全闭塞,鞘膜囊与腹腔不相通,该类型的鞘膜囊内液体来源于囊壁的自身分泌^[6]。

早期观点认为儿童鞘膜积液的鞘状突内壁表面主要是由单层柱状上皮构成,而本研究结果显示儿童鞘膜积液的鞘状突内壁表面是完整的单层扁平间皮细胞,深部有稀疏的血管和淋巴管以及成纤维细胞、脂肪组织等,并没有发现具有分泌功能的腺体类结构^[7,8]。王玉娟等^[9]进一步通过电镜扫描发现儿童腹膜、斜疝疝囊和鞘膜积液囊壁的内膜均为扁平间皮细胞构成,深面均为纤维结缔组织。与腹膜表面具有较明显微绒毛相比,鞘膜积液内壁微绒毛明显稀疏,间皮细胞层完整而光滑。因此,病理学证据不支持儿童鞘膜积液囊壁具有明显分泌能力的观点。由于本研究纳入的对象均为年龄大于 2 岁达到手术指征的患儿,因此关于新生儿期鞘

膜囊壁的病理学研究还有待进一步证实。

对于儿童鞘膜积液的治疗,单纯的穿刺抽吸囊内液的治疗方法无论对于交通性鞘膜积液,还是非交通性鞘膜积液,均可能在术后出现复发^[10]。随着腹腔镜手术治疗儿童腹股沟斜疝被越来越多的专家所接受,临床中偶尔碰到单侧斜疝合并对侧非交通性鞘膜积液的患儿,腹腔镜斜疝手术时我们发现非交通性鞘膜积液的鞘状突也呈开放状态(图 2A)^[11-13]。本研究 395 例儿童鞘膜积液的腹腔镜探查结果显示:134 例交通性鞘膜积液患儿和 261 例非交通性鞘膜积液患儿的内环口水平处鞘状突均呈开放状态。两者的区别在于,非交通性鞘膜积液的鞘膜囊顶端均可以发现小孔样结构,表面覆盖有层膜状瓣膜样结构。Saka 等^[14]日本学者也发现所有鞘膜积液患儿的鞘状突呈开放状态,包括非交通性鞘膜积液患儿。由于病理学不支持鞘膜囊壁有分泌能力,因此本研究推测囊内液体有可能通过开放的鞘状突来源于腹腔内液体。本研究通过滴注美兰液实验证实了该观点,与交通性鞘膜积液患儿一样,在非交通性鞘膜积液患儿中美兰液也可从腹腔流入到鞘膜囊内,只是更加缓慢;从鞘膜囊内注射美兰液,非交通性鞘膜积液患儿也可见液体从囊壁顶端小孔缓慢溢出。曾经有学者提出在鞘膜囊上有一瓣膜样的结构,腹腔液可经鞘状突管单向进入鞘膜囊,而不易逆流,本研究的结果与这一观点类似^[15,16]。

本研究发现无论对于交通性鞘膜积液,还是非交通性鞘膜积液,在鞘膜囊穿刺抽液之前,只要通过腹腔镜下牢固结扎而闭合鞘状突,就可以治愈。所有患儿术后常规随访 1 年以上,最长随访 15 年,复发病例较少,一期治愈率可达 98.5%。该研究结果与 Zhang Y^[17]和 Wang F^[18]等研究结果相似。本研究中有 6 例复发,复发原因可能是手术中关闭鞘状突时留有缝隙所致。临床疗效进一步显示儿童鞘膜积液的液体,包括非交通性者,实际上是通过未闭合的鞘状突来源于腹腔内液。

综上所述,儿童鞘膜积液的发病机制与鞘状突先天性发育异常有关,初步认定开放状态的鞘状突是其主要发病因素。该研究结果为开展腹腔镜下高位结扎鞘状突管治疗儿童鞘膜积液提供了重要的理论基础^[19-21]。

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