doi:10.11659/jjssx.07E016082

·临床研究·

先天性房间隔、室间隔缺损的经胸微创封堵治疗

曾祥君[1],丁 瑜[2],虞 华[3],王信杰[3],种朋贵[2],郑文庆[4],方彦鹏[5] (1.贵州省人民医院心外科,贵州 贵阳 550004;2.贵阳中医学院第二附属医院麻醉科,贵州 贵阳 550001;3.贵阳中医学院第二附属医院心胸外科,贵州 贵阳 550001;4.贵阳中医学院第二附属医院心内科,贵州 贵阳 550001;5.贵阳中医学院第二附属医院超声科,贵州 贵阳 550001)

[摘 要] **目的** 评估在食道心脏超声引导下经胸微创封堵先天性房、室间隔缺损的疗效及安全性。**方法** 回顾性分析2013年9月至2015年6月贵阳中医学院第二附属医院收治的44例经胸微创封堵心脏房、室间隔缺损患者的临床资料。所有患者术中经食管超声心动图监测并引导封堵伞的放置,评价手术效果,术后门诊定期随访患者心电图、超声心动图。**结果** 44例患者中43例先天性间隔缺损(室缺28例,房缺16例,其中1例为室缺合并房缺患者)封堵成功,1例室缺患者中转为心内直视手术。手术时间22~48 min,手术切口2~4.5 cm,术后呼吸机辅助时间1~5 h,术后引流量小于50 mL,术后住院时间2~6 d。所有患者均治愈出院。出院病例随访1~12个月,封堵器位置良好,无残余分流,无封堵术导致的瓣膜返流及心律紊乱。**结论** 在食道心脏超声引导下经胸封堵手术治疗先天性房、室间隔缺损具有微创、简便、安全、恢复快等优点,近期随访疗效满意。

[关键词] 房间隔缺损;室间隔缺损;微创;外科封堵术;心脏超声

[中图分类号] R655;R654.2 [文献标识码] A [收稿日期] 2016-07-29

Transthoraic mini-invasive surgical occlusion of atrial and ventricular septal defects

ZENG Xiang-jun[1], DING Yu[2], YU Hua[3], WANG Xin-jie[3], CHONG Peng-gui[2], ZHENG Wen-qing[4], FANG Yan-peng[5] (1. Department of Cardiovascular Surgery, People's Hospital of Guizhou Province, Guiyang Guizhou 550004, China; 2. Department of Anesthesia, Second Affiliated Hospital of Guiyang College of Traditional Chinese Medicine, Guiyang Guizhou 550001, China; 3. Department of Cardiothoracic Surgery, Second Affiliated Hospital of Guiyang College of Traditional Chinese Medicine, Guiyang Guizhou 550001, China; 4. Department of Cardiology, Second Affiliated Hospital of Guiyang College of Traditional Chinese Medicine, Guiyang Guizhou 550001, China; 5. Department of Ultrasonography, Second Affiliated Hospital of Guiyang College of Traditional Chinese Medicine, Guiyang Guizhou 550001, China)

Abstract: Objective To investigate the efficacy and safety of transthoracic minimally invasive occlusion operation guided by transesophageal echocardiography for the treatment of congenital atrial or/and ventricular septal defects (ASD/VSD). **Methods** The clinical data of a total of 44 patients who underwent surgical occlusion operation from September 2013 to June 2015 were summarized. The whole course of occlusion procedure were dynamically monitored and guided by transesophageal echocardiography. All the patients were followed up regularly by electrocardiogram and echocardiograph. **Results** Among the 44 patients, 43 patients (28 VSDs and 16 ASDs, including one patient suffered with VSD and ASD simultaneously) were occluded successfully, and the other patient with VSD who failed in the surgery was converted to open heart repair. The occlusion operations were finished within 22 to 48 min. The length of incision spaned from 2 to 4.5 cm. The ventilator was used for 1 to 5 hours. The total drainge volumes were recorded each patient from 0 to 50 mL. The postoperative hospitalization stay was 2 to 6 days, and all patients survived and were discharged. During the follow-up of 1 to 12 months, there was no cases with A-V conduction block, valve incompetent, cardiac arrhythmia and residual shunt of heart septel defect. **Conclusion** Transthoraic mini-invasive surgical occlusion of atrial and ventricular septal defects is a therapeutic method with less trauma, higher safety and feasiblity, faster recovery,

[10] 程 超,李梓瑞,刘海波,等.游离桡动脉掌浅支腕横纹皮瓣修复手指软组织半环形缺损[J].实用手外科杂志,2016,30(1):94-95.doi:10.3969/j.issn.1671-2722.2016.01.036.

[11] Sakai S. Free flap from the flexor aspect of the wrist for resurfacing defects of the hand and fingers [J]. Plast Reconstr Surg,2003,111(4):1412-1420.doi:10.1097/01.PRS.0000049883.75820.4F.

[12] 郑大伟,黎章灿,许 立,等.桡动脉掌浅支腕横纹皮瓣在手指创面修复中的应用[J].中国美容医学杂志,2014,23(4):263-266.doi:10.3969/j.issn.1006-1959.2014.30.101.

[13] 刘建标.手部创伤患者应用桡动脉掌浅支腕横纹游离皮瓣修复的临床效果观察[J].创伤外科杂志,2015,17(3):240-242.doi:1009-4237(2015)03-0240-03.

[14] Zheng DW, Li ZC, Shi RJ, et al. Thumb reconstruction via a pedicled flap based on the superficial palmar branch of the radial artery from the wrist crease area. [J]. J Plast Reconstr Aesthet Surg,2015,68(11):1581-1587.doi:10.1016/j.bjps.2015.07.003.

[15] Iwuagwu FC, Orkar SK, Siddiqui A. Reconstruction of volar skin and soft tissue defects of the digits including the pulp: experience with the free SUPBRA flap[J]. J Plast Reconstr Aesthet Surg,2014,68(1):26.doi:10.1016/j.bjps.2014.08.064.

(编辑:左艳芳)

and the short-term therapeutic effect is satisfying.

Keywords: atrial septal defect;ventricular septal defect;minimally invasive;surgical occlusion procedure;echocardiography

房、室间隔缺损是临床上最常见的先天性心脏病,传统的体外循环心内直视修补手术成功率已接近100%,但手术切口长,术后瘢痕外露影响美观,甚至影响患儿的心理健康。内科介入治疗以美观、微创等优点易于获得患儿家长认同而得到广泛应用,但同时也存在年龄限制、适应证范围窄、放射线暴露及发生房室传导阻滞等不足[1]。心脏间隔缺损经胸微创封堵手术是近年来在介入封堵术基础上发展起来的新术式,较介入手术有适宜手术年龄降低、无放射线损伤、手术操作直观等优点[2],但其安全性及疗效尚存争议。本研究总结2013年9月至2015年6月贵阳中医学院第二附属医院心胸外科44例房、室间隔缺损经胸微创封堵手术经验,探讨该术式的适应证、术中操作要点、安全性及疗效。

1 资料与方法

1.1 临床资料

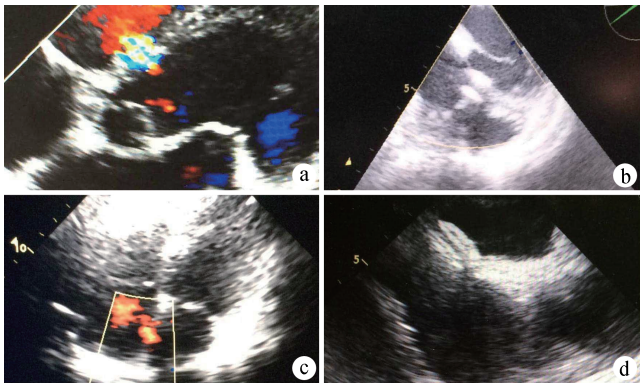
本组患者44例,其中男20例,女24例;年龄9个月至46岁(中位年龄11.5岁);体质量8~65 kg(中位体质量31.2 kg)。所有病例术前经胸心脏超声检查明确诊断,全身麻醉后经食管心脏超声再次评估心脏畸形,包括缺损大小、位置、边缘毗邻情况。心血管畸形包括:室间隔缺损28例(膜周型14例,干下型12例,肌部型2例),其中膜周部室缺合并房缺1例;单纯房间隔缺损16例(均为中央型)。

1.2 手术方法

全组在全身麻醉气管插管平卧位实施手术,常规建立桡动脉持续测压和中心静脉补液通道。根据经胸心脏超声和经食管心脏超声结果,选择大小合适的封堵器,等边室缺封堵器腰部直径比室间隔缺损(ventricular septal defect,VSD)最大径大1~2 mm,偏心室缺封堵器腰部直径比VSD最大径大2~4 mm,房缺封堵器腰部直径比房间隔缺损(auricular septal defect,ASD)最大径大4~6 mm。

VSD封堵术均采取胸骨下段正中切口(3~4 cm),锯开部份下段胸骨。“⊥”形切开部分心包并悬吊,静脉给予肝素1 mg/kg。与麻醉超声医师密切配合,以无损伤镊轻压右心室前壁,经食管超声心动图(transesophageal echocardiography,TEE)引导下选择对向室缺分流口的右室表面无血管区为穿刺部位,4-0速捷普线于穿刺部位缝合带自体心包垫片的荷包,置圈套止血器,在荷包内刺入18G套管针,退出针芯,经套管置入导引钢丝,TEE引导下导引钢丝经VSD进入左心室腔内,沿导引钢丝将输送鞘管经VSD送达左心室腔,并退出鞘芯及导引钢丝。封堵器右盘面中心缝置4-0速捷普线,末端经装载鞘管末端牵出,将装好封堵器的装载鞘管与输送鞘管对接,TEE监视下推送封堵器并缓慢释放封堵器的左盘面至左心室腔。偏心封堵器需在TEE监视下调整至大缘对准主动脉瓣远端方可释放左盘面。使左盘面紧贴室间隔左心室面,回撤输送鞘管释放封堵器腰部。TEE评估残余分流、封堵器的贴服、心脏瓣膜启闭,心电图监视心律变化及ST段改变。确认无异常后,释放右盘面,并进行反复的推拉试验,TEE再次评估封堵器位置是否良好,有无过隔残余分流,有无瓣膜反流加重以及心电异常,必要时调整或更换封堵器。确认无误后,撤出输送装置,保留适当长度4-0速捷普牵引线,与荷包缝线打结。安放单根心包引流管,可吸收线缝合切口。术毕回ICU,常规监护。

ASD封堵术与VSD封堵相似,采取右侧胸骨旁第四肋间2~3 cm切口或胸骨中下段正中切口3~4 cm,右心房表面缝置荷包缝线,荷包内心房壁小切口,在TEE监视下手术程序及评估基本同VSD封堵,另需观察封堵器对腔静脉、冠状静脉窦及右肺静脉的血流影响(图1)。所有病例术后当日开始予低分子肝素针脐周皮下注射(100 u/kg,每天2次),2 d后改为口服肠溶阿司匹林片(5 mg/kg,每天1次),6个月后停止服药。



a:封堵前四腔心切面见膜周部室缺;b:封堵后左室长轴切面见封堵器镶嵌于室缺位置,无残余分流;c:封堵前四腔心切面见中央型房缺;d:封堵后右室流出道切面见封堵器镶嵌于房缺位置,无残余分流

图1 房、室间隔缺损封堵前后经食道超声心动图

1.3 术后随访

患者出院后1、6、12个月定期门诊随访,并复查经胸超声心动图及心电图。观察随访患者心功能、封堵器位置、有无残余分流、心脏瓣膜返流情况以及心电图有无异常。

2 结果

2.1 手术情况

全组43例患者成功完成心脏房、室间隔缺损封堵治疗(成功率97.7%),1例患儿因导丝未能引导通过室缺孔中转为心内直视手术,共放置封堵器44个,一鞘双伞封堵膜周部室缺合并房缺1例。房缺封堵器16个置入中央型房间隔缺损(封堵器腰部直径6~32 mm),等边室缺封堵器16个置入膜周部室间隔缺损(封堵器腰部直径6~16 mm),偏心室缺封堵器12个置入嵴部及干下型室间隔缺损(封堵器腰部直径7~10 mm),封堵操作完成后经食道心脏超声评估证实封堵器位置良好,无过隔残余分流及瓣膜返流加重,心电监护无明显心电异常。手术时间22~48 min,平均(30±8)min;胸骨中下段正中切口3~4.5 cm,平均(3.8±0.6)min;右侧胸骨旁第四肋间切口2~3 cm,平均(2.6±0.5)cm;术后呼吸机辅助时间1~5 h,平均(3±1.5)h,术后胸腔、纵隔引流量0~50 mL,平均(30±15)mL;住院时间2~6 d,平均(4±2)d。所有患者均治愈出院。

2.2 随访情况

出院病例随访1~12个月,所有病例术后心功能Ⅰ级,无血栓、出血事件,复查经胸超声心动图示所有患者术后置入封堵器位置良好,无间隔残余分流,无封堵术导致的瓣膜返流,复查心电图均为窦性心律,无房室传导阻滞。

3 讨论

经胸微创房、室间隔缺损封堵手术常规采用胸骨下段正中切口,一般3~6 cm切口均可完成操作,房缺患者可采用右侧胸骨旁第4肋间2~3 cm切口[3-4]。本组患者手术切口2~4.5 cm,较传统体外循环下间隔缺损修补术切口明显缩短,且美观隐蔽,体现了微创、保护患者隐私的优势,尤其利于提高女性患者的术后生活质量。

先心病介入封堵手术同样具有微创、美观、无需体外循环、术后恢复快、住院时间短等优势[5]。但介入封堵术较传统手术存在明显不足,如患儿有年龄限制(一般需大于2岁)、适宜介入封堵的间隔缺损谱窄、股动静脉血管内膜创伤导致血管内血栓形成风险及医患的射线暴露损伤等[6-7]。本组患者年龄最小为9个月,突破了介入手术的低龄限制;经胸入路实施手术,避免了股动静脉血管创伤;经食道心脏超声引导手术,避免了医患的射线暴露损伤。表明经胸微创房、室间隔缺损封堵术能克服放射介入封堵手术固有的不足之处[8]。

房、室间隔缺损经皮介入封堵,术中出现封堵器移位脱落、房室传导阻滞、三尖瓣瓣膜及瓣下腱索损伤、二尖瓣及三尖瓣反流加重、术后残余过隔分流等不良事件现在多有报道[9-11],不良事件总发生率明显高于传统开胸体外循环直视手术[12-14]。本组43例成功经胸微创封堵房、室间隔缺损,无封堵器脱落、房室传导阻滞等不良事件发生,1例因导丝未能引导通过室间隔缺损转为体外循环手术,患者均治愈出院,术后1~12个月复查心脏超声及心电图,均无残余分流、封堵术导致的瓣膜反流及房室传导阻滞等心律紊乱,获得比较理想的治疗效果。

笔者认为,经胸微创封堵房、室间隔缺损之所以能获得较好封堵效果,首先依赖经食管心脏超声的术中应用,能于操作中、操作后全程动态评估间隔缺损的大小、形态、毗邻关系、瓣膜反流情况[15-17],利于封堵器大小、类型的选择及根据情况修正、终止手术;其次依赖术前经胸心脏超声对间隔缺损情况详细行定量检查,严格把握手术指征,排除手术禁忌及高风险病例;鉴于较大间隔缺损封堵术中、术后并发症明显增高[18],大直径间隔缺损尽量考虑开胸体外循环直视手术;另外,经胸外科封堵手术存在操作上的优势,其输送鞘基本垂直于间隔缺损平面送入封堵器,避免了介入手术释放封堵器时对缺损边缘产生的扭力,利于封堵器的释放固定,最大限度减少封堵器对缺损边缘的压迫切割损伤,尤其是对间隔周围传导束的损伤,拓宽了间隔缺损封堵的适应范围[19]。

根据经胸心脏超声和经食管心脏超声结果,选择合适类型、大小的封堵器要点有:①置入等边室缺封堵器,室缺边缘与主动脉瓣及三尖瓣距离需大于2 mm;②室缺边缘与主动脉瓣距离小于2 mm,且与三尖瓣距离大于2 mm,宜选择偏心室缺封堵器;③等边室缺封堵器腰部直径比室缺最大径大1~2 mm,偏心室缺封堵器腰部直径比室缺最大径大2~4 mm[20];④房缺封堵器腰部直径需比房缺最大径大4~6 mm,缺口边缘需大于4 mm,但房缺封堵器外径须小于三尖瓣环至心房顶的距离[21]。

室间隔缺损封堵以膜周部、肌部、流出道部室缺为

适应证,以下情形应列为经胸微创室间隔外科封堵手术禁忌:流入道隔瓣后室缺,对位不良型室缺,合并主动脉瓣明显脱垂伴中度以上反流的室缺,合并需要行体外循环心内直视手术的其他心脏畸形或合并感染性心内膜炎等心脏情况[22]。肺动脉瓣下室缺外科封堵需谨慎决策,因释放封堵器时需逆时针旋转输送内芯,可能导致封堵器位置改变,经食道心脏超声监视下,若轻微调整封堵器位置即出现主动脉瓣反流,应当终止封堵手术。经胸微创房间隔缺损封堵以继发孔中央型房缺为适应证,上腔型房缺和下腔型房缺均不适宜封堵治疗,比邻主动脉根部的房缺边缘短小不是手术禁忌。

本组结果提示经胸微创封堵房、室间隔缺损具有美观、创伤小、准确性高、适应证较介入封堵更广等优势,是一种简单、有效、可行、较为安全的手术方式,近期疗效满意。由于尚无远期随访资料,远期疗效仍需进一步随访观察。

[参考文献]

[1] Chen Q,Cao H,Zhang GC,et al. Closure of perimembranous ventricular septal defects with intraoperative device technique:another safe alternative to surgical repair[J]. Thorac Cardiovasc Surg,2013,61(4):293 - 299. doi:10.1055/s - 0032 - 1311532.

[2] Xing Q,Wu Q,Shi L,et al. Minimally invasive transthoracic device closure of isolated ventricular septal defects without cardiopulmonary bypass:long-term follow-up results[J]. J Thorac Cardiovasc Surg,2015,149(1):257 - 264. doi:10.1016/j.jtcvs.2014.07.078.

[3] 赵铁夫,王盛宇,张总刚,等.非体外循环房间隔缺损封堵术切口选择的探讨[J].北京医学,2008,30(2):78 - 80. doi:10.3969/j.issn.0253 - 9713.2008.02.005.

[4] 孙俊杰,彭帮田,范太兵,等.食管超声引导下经胸微创外科封堵治疗先天性心脏病研究[J].中华实用诊断与治疗杂志,2014,28(10):964 - 965. doi:10.13507/j.issn.1674 - 3474.2014.10.011.

[5] Jalal Z, Hascoet S, Baruteau AE, et al. Long-term complications after transcatheter atrial septal defect closure:a review of the medical literature[J]. Can J Cardiol,2016,32(3):213 - 221. doi:10.1016/j.cjca.2016.02.068.

[6] Ghelani SJ,Glatz AC,David S,et al. Radiation dose benchmarks during cardiac catheterization for congenital heart disease in the United States[J]. JACC Cardiovasc Interv,2014,7(9):1060 - 1069. doi:10.1016/j.jcin.2014.04.013.

[7] Kefer J,Sluysmans T,Hermans C,et al. Percutaneous transcatheter closure of interatrial septal defect in adults:procedural outcome and long-term results[J]. Catheter Cardiovasc Interv,2012,79(2):322 - 330. doi:10.1002/ccd.23119.

[8] Tzikas A,Ibrahim R,Velasco-Sanchez D,et al. Transcatheter closure of perimembranous ventricular septal defect with the Amplatzer(R) membranous VSD occluder 2:initial world experience and one-year follow-up[J]. Catheter Cardiovasc Interv,2014,83(4):571 - 580. doi:10.1002/ccd.25004.

[9] Chen Q,Cao H,Zhang GC,et al. Atrioventricular block of intraoperative device closure perimembranous ventricular septal defects:a serious complication[J]. BMC Cardiovasc Disord,2012,12:21. doi:10.1186/1471 - 2261 - 12 - 21.

[10] Matyal R,Wang A,Mahmood F. Percutaneous ventricular septal defect closure with Amplatzer devices resulting in severe tricuspid regurgitation[J]. Catheter Cardiovasc Interv,2013,82(6):E817 - 820. doi:10.1002/ccd.24803.

[11] Holzer RJ,Sallehuddin A,Hijazi ZM. Surgical strategies and novel alternatives for the closure of ventricular septal defects[J]. Expert Rev Cardiovasc Ther,2016,14(7):831 - 841. doi:10.1586/14779072.2016.1169923.

[12] Thakkar B,Patel N,Bohora S,et al. Transcatheter device closure of perimembranous ventricular septal defect in children treated with prophylactic oral steroids:acute and mid-term results of a single-centre,prospective,observational study[J]. Cardiol Young,2016,26(4):669 - 676. doi:10.1017/S1047951115001018.

[13] 徐争鸣,郑 宏,蒋世良,等.房间隔缺损封堵器脱落及相关并发症原因分析[J].中国介入心脏病学杂志,2012,20(1):28 - 31. doi:10.3969/j.issn.1004 - 8812.2012.01.010.

[14] 蒋世良,徐仲英,黄连军,等.室间隔缺损封堵术的并发症及其防治[J].中国介入心脏病学杂志,2007,15(6):302 - 305. doi:10.3969/j.issn.1004 - 8812.2007.06.002.

[15] Yang Y,Gao L,Xu X,et al. Echocardiographic assessment and guidance in minimally invasive surgical device closure of perimembranous ventricular septal defects[J]. Heart Surg Forum,2014,17(4):E206 - 211. doi:10.1532/HSF98.2014340.

[16] Lee WC,Fang CY,Huang CF,et al. Predictors of atrial septal defect occluder dislodgement[J]. Int Heart J,2015,56(4):428 - 431. doi:10.1536/ihj.15 - 065.

[17] Zhou D,Pan W,Guan L,Ge J,et al. Transcatheter closure of perimembranous and intracristal ventricular septal defects with the SHSMA occluder[J]. Catheter Cardiovasc Interv,2012,79(4):666 - 674. doi:10.1002/ccd.23344.

[18] Ostermayer SH,Srivastava S,Doucette JT,et al. Malattached septum primum and deficient septal rim predict unsuccessful transcatheter closure of atrial communications[J]. Catheter Cardiovasc Interv,2015,86(7):1195 - 1203. doi:10.1002/ccd.26102.

[19] Zhang GC,Chen Q,Cao H,et al. Minimally invasive perventricular device closure of ventricular septal defect in infants under transthoracic echocardiograhic guidance:feasibility and comparison with transesophageal echocardiography[J]. Cardiovascular Ultrasound,2013,11:8. doi:10.1186/1476 - 7120 - 11 - 8.

[20] 何慧灵.经胸小切口室间隔缺损封堵术中经食管超声心动图的应用实效性评价[J].浙江创伤外科,2016,21(4):716 - 718. doi:10.3969/j.issn.1009 - 7147.2016.04.051.

[21] 郭艳琴,芦 芳,张 玖,等.经胸超声心动图在继发孔型房间隔缺损封堵治疗中的作用[J].临床医药实践,2015(10):734 - 736.

[22] 李 伟,顾伟礼,励 峰,等.微创经胸小切口室间隔缺损封堵术的临床应用[J].中国胸心血管外科临床杂志,2016,23(2):191 - 193. doi:10.7507/1007 - 4848.20160042.

(编辑:刘 艺)