

Patient perception, satisfaction and cosmetic results of surgical atrial septal defect closure: Minithoracotomy versus sternotomy

Cerrahi olarak atriyal septal defekt kapatılmasının kozmetik sonuçları, hasta algısı ve memnuniyeti: Sternotomiye göre minitorakotomi

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ABSTRACT

Background: This study aims to compare two surgical techniques [right lateral minithoracotomy (RLMT) and median sternotomy (MS)] used to close atrial septal defects (ASD), and measure patient satisfaction, cosmetic results, and patient perception with tests used for evaluating scar and mental status.

Methods: A total of 26 ASD patients were included in the study, of which 14 were operated with the MS method (group MS), and 12 were operated with the RLMT method (group RLMT). Patients were divided into two groups according to the incision sites. Patients' incision scars were assessed objectively according to Vancouver Scar Scale (VSS), and Patient and Observer Scar Assessment (POSAS) criteria. Besides, patients were administered Patient Satisfaction Score (PSS), Body Image Questionnaire (BIQ), and The Hamilton Anxiety Rating Scale (HAM-A) to measure their perception.

Results: Overall patient satisfaction was greater in the RLMT group than the MS group ($p=0.021$). There was no significant difference between the two groups in terms of VSS, BIQ, HAM-A, and skin type. Average scar length ($p<0.0001$), cardiopulmonary bypass time ($p=0.016$), and duration of hospital stay ($p=0.019$) were shorter in patients who were performed RLMT than those who were performed MS.

Conclusion: Our study revealed that patients who were performed RLMT were more satisfied with their scar result. Although scar features of patients may be similar, incision site may depend on the decisions of patients who do not prefer to reveal having undergone a surgical intervention to their chest. Right lateral minithoracotomy also reduces the length of hospital stay. Our findings may contribute to further research on the most appropriate surgical technique for ASD closure.

Keywords: Atrial septal defect; cosmetic results; incision cite; patient satisfaction.

ÖZ

Amaç: Bu çalışmada atriyal septal defekt (ASD) kapatılmasında kullanılan iki cerrahi teknik [sağ lateral minitorakotomi (RLMT) ve median sternotomi (MS)] karşılaştırıldı ve hasta memnuniyeti, kozmetik sonuçlar ve hasta algısı skar ve mental durum değerlendirilmesinde kullanılan testlerle ölçüldü.

Çalışma planı: Çalışmaya MS yöntemi ile ameliyat edilen 14 (grup MS) ve RLMT yöntemi ile ameliyat edilen 12 (grup RLMT) hasta olmak üzere toplam 26 ASD hastası dahil edildi. Hastaların insizyon bölgelerine göre iki gruba ayrıldı. Hastaların insizyon skarları Vancouver Yara İzi Ölçeği (VSS) ve Hasta ve Gözlemci Yara İzi Değerlendirme (POSAS) kriterlerine göre objektif olarak değerlendirildi. Bunun yanı sıra, hastaların algısını ölçmek için hastalara Hasta Memnuniyeti Puanı (HMP), Beden Algısı Anketi (BAA) ve Hamilton Anksiyete Derecelendirme Ölçeği (HADÖ) uygulandı.

Bulgular: Toplam hasta memnuniyeti RLMT grubunda MS grubundan daha fazla idi ($p=0.021$). İki grup arasında VSS, BAA, HADÖ ve cilt tipi açısından anlamlı farklılık yoktu. Ortalama skar uzunluğu ($p<0.0001$), kardiyopulmoner baypas zamanı ($p=0.016$) ve hastanede kalış süresi ($p=0.019$) RLMT uygulanan hastalarda MS uygulanan hastalardan daha kısa idi.

Sonuç: Çalışmamız RLMT uygulanan hastaların skar sonuçlarından daha memnun olduğunu gösterdi. Hastaların skar özellikleri benzer olsa da insizyon yeri göğüs kafesine cerrahi girişim yapıldığının belli olmasını istemeyen hastaların kararına bağlı olabilir. Sağ lateral minitorakotomi hastanede kalış süresini de kısaltır. Bulgularımız ASD kapatılmasında en uygun cerrahi teknik hakkında ileri araştırmalara katkı sağlayabilir.

Anahtar sözcükler: Atriyal septal defekt; kozmetik sonuçlar; insizyon yeri; hasta memnuniyeti.



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Atrial septal defects (ASDs) are the most frequently reported heart defect, accounting for approximately 6-10% of all congenital cardiac defects.^[1,2] Closing the ASD via interventional methods is the preferred strategy in many patients,^[3] but the vast majority of patients with this heart defect are not good candidates for percutaneous ASD closure; therefore, they are referred for surgery.

A median sternotomy (MS) is the standard surgical approach for ASD closure, but over the last decade, minimally invasive techniques have been increasingly used for the surgical treatment of ASD^[4] because of their well-known advantages, for example earlier mobilization, the use of less blood products, and better cosmetic results. However, to the best of our knowledge, there are no detailed reports in the literature that have focused on body image or patient satisfaction with regard to ASD closure, and none have included objective cosmetic evaluations of the patients who underwent this type of surgery. Therefore, the goal of this study was to compare the minimally invasive technique that we use at our facility, a right lateral minithoracotomy (RLMT), with the more conventional MS with regard to the cosmetic appearance of the scar as well as the patients' satisfaction and perception of the procedure.

PATIENTS AND METHODS

Between November 2011 and November 2013, 26 patients who underwent surgical ASD closure with open heart surgery at our facility were analyzed. These patients were divided into two groups by the type of incisions that were used: the MS group consisted of 14 patients and the RLMT group was comprised of the other 12. The mean age of the patients in the two groups was 12.4±5.6 years (range 4 to 18), and their demographic features were similar, except for the female predominance in the RLMT group (p=0.006) (Table 1). In addition, the upper and lower limits of the weight and height by groups were 7-72 kg/122-163 cm in the MS group and 12-75 kg/100-170 cm in the RLMT group. All of the patients were invited to the hospital six months after the operation, and their scars were examined by the same plastic surgeon who performed the original procedure. At that time, the patients were also asked by a psychologist to fill out a questionnaire to evaluate the patients' satisfaction with their scars, assess their opinions related to their body image, and evaluate their anxiety levels.

This study was approved by the ethics committee of our hospital and was conducted in accordance with the Declaration of Helsinki and "good clinical practice" guidelines. Additionally, we also obtained the patients' written informed consent to be included in the study.

Table 1 Demographic and operative properties of group right lateral minithoracotomy and group median sternotomy

	Grup MS (n=14)					Grup RLMT (n=12)					p
	n	%	Mean±SD	Median	Min.-Max.	n	%	Mean±SD	Median	Min.-Max.	
The age at operation (years)			13.2±8.7					9.6±5.0			0.138
Sex											
Male	11	78.6				3	25				0.006
Female	3	21.4				9	75				
Weight (kg)			37±24.3					4.8±20.2			0.742
Height (cm)			137.6±24.4					132.8±20.7			0.629
Body surface area			1.2±0.5					1.1±0.4			0.598
Body mass index			17.5±6.3					18.1±5.0			0.823
Cross clamp time (minute)			25.6±8.7					23.3±6.3			0.499
CPB time (minute)			57.7±14.6					42.2±12.7			0.016
Hospital stay (days)			7.4±3.1					5±1.0			0.019
Size of the ASD (cm)			20.7±8.2					21±6.5			0.923
The length of the scars (mm)			101.9±16.2					158.5±31.0			<0.0001
The duration of follow-up (months)				12	5-24				5.5	3-22.5	0.352
Fitzpatrick classification			0.369								
1 (white skin with blond hair, blue eyes)	0	0				1	8.3				
2 (white skin with blond hair; blue, green eyes)	5	35.7				2	16.7				
3 (cream-colored or white skin, fair, with any eye or hair color)	5	35.7				7	58.3				
4 (olive-brown skin)	4	28.6				2	16.7				

SD: Standard deviation; Min.: Minimum; Max.: Maximum; MS: Median sternotomy; LMT: Lateral minithoracotomy; CPB: Cardiopulmonary bypass; ASD: Atrial septal defects.

The standard RLMT technique was performed on all of the patients who underwent this procedure. The location of the skin incision was marked with a permanent marker preoperatively with the patients in a standing position. Under general anesthesia, they were then placed in the left lateral decubitus position, and their arms were suspended at a right angle. The skin incision was made between the right anterior and posterior axillary line over the sixth and seventh intercostal space, but it did not cross over the future breast line. The heart was then accessed through the fourth intercostal space using a thoracic retractor. We also employed transthoracic aorto-bicaval cannulation and standard cardiopulmonary bypass (CPB) with moderate hypothermia (32 °C) and cardioplegic arrest during this procedure (Figure 1), and the ASD was closed with a glutaraldehyde-treated autologous pericardial patch.

For the MS technique, the patient was placed in the supine position, and a traditional full sternotomy with a minimal skin incision was performed. A midline skin incision was then started at the level of the angulus sterni and then extended to the level of the xiphoid process. Aorto-bicaval cannulation and standard CPB were then performed using moderate hypothermia (32 °C) and cardioplegic arrest.

In both groups, the same suture materials were used to close the wounds (Vicryl 4.0, Doğsan, Inc., Trabzon, Turkey), and the skin was closed intradermally.

Table 2 summarizes the score range and direction of the tools to assess the scar and evaluate the patient's satisfaction with the cosmetic results. At the postoperative sixth month, age-based questionnaires, which were filled out by the patients themselves or their parents under the supervision of a psychologist,



Figure 1. View of the surgical field during the thoracic procedure.

were filled out, and there was no missing data. The patients' statements were also pooled to obtain more precise information regarding the cosmetic outcomes of the conventional surgery. Furthermore, a trained psychologist conducted interviews with the patients to determine the Patient Satisfaction Score (PSS), and this was used to assess the negative and positive emotions regarding their scars. We also used the Body-Image Ideals Questionnaire (BIQ) and the Hamilton Anxiety Rating Scale (HAM-A) to evaluate the participants' views concerning their body image and anxiety levels, respectively.

All wounds were followed up and assessed by a plastic surgeon using the Vancouver Scar Scale (VSS) and Patient and Observer Scar Assessment Scale (POSAS) at the postoperative sixth month,^[5,6] and the

Table 2. Score range of the tools used to assess the scars and evaluate patient satisfaction

Tool	Scores		
	Questions	Range	
Patient satisfaction score			
1 (Very satisfied)	}	1-4	
2 (Satisfied)			
3 (Dissatisfied)			
4 (Very dissatisfied)			
Vancouver scar scale			
0-3 (Pigmentation)	}	0-14	
0-3 (Vascularity)			
0-5 (Flexibility)			
0-3 (Height)			
Patient and observer scar assessment			
0-10 (Pain)	}	0-70	
0-10 (Itching)			
0-10 (Color)			
0-10 (Stiffness)			
0-10 (Thickness)			
0-10 (Irregularity)			
0-10 (Overall opinion of the scar)			
Body image questionnaire			
1 (Very satisfied)	}	40	40-200
2 (Quite satisfied)			
3 (Undecided)			
4 (Dissatisfied)			
5 (Very dissatisfied)			
Hamilton anxiety rating scale			
Each item of HAM-A is scored on a scale of	}	13	0-56
0 (Not present) to 4 (Severe)			
0-5 (No anxiety)			
6-14 (Mild anxiety)			
15 and above (Major anxiety)			

HAM-A: Hamilton anxiety rating scale.

Fitzpatrick skin type classification scale was used for categorizing our patient’s skin properties.^[7]

The VSS contains four variables with the following scores: pigmentation (normal 0, hypopigmentation 1, mixed 2, and hyperpigmentation 3), vascularity (normal 0, pink 1, red 2, and purple 3), flexibility (normal 0, supple 1, yielding 2, firm 3, ropes 4, and contracture 5), and height (flat= 0, <2 mm= 1, 2-5 mm= 2, and >5 mm= 3).

The final cosmetic and functional results were evaluated using the POSAS, which consists of an observer and a patient scale. The aim of this instrument is to measure the scar quality and its features from both the patient and observer perspectives. However, we used only the observer scale in the younger patients in our two groups since they could not adequately express their opinions. In this scale, the observer rated the scar’s vascularity, pigmentation, flexibility, thickness, relief, and surface area. The patient scale of the POSAS consists of seven items (pain, itching, color, stiffness, thickness, irregularity, and overall opinion of the scar compared to the normal skin). Because children may not be able to make a distinction between the color and vascularity of their scars, we asked their parents to help determine whether the scar was itchy and painful.

The BIQ was used to evaluate the patients’ perceptions of their bodies and scars. In this evaluative tool, a psychologist asked the parents of our patients the questions related to body image, and the patients answered the cosmetic subscale questions. The BIQ is a Likert-type instrument^[8,9] that assesses body-image satisfaction/dissatisfaction by measuring the degree of discrepancy of 11 self-perceived and idealized physical attributes (e.g., weight, facial features, muscle tone/definition, physical strength, overall appearance, etc.).

The HAM-A was also used to determine the anxiety level of the patients.^[10] The HAM-A has 13

questions. Each item of HAM-A is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0-56. Results according to scores: 0-5, no anxiety; 6-14, mild anxiety; 15 and above, major anxiety. At the end of each of the questionnaires, the psychologist also asked the patients to write how they felt about their operation and scars.

Statistical methods

All statistical calculations were performed using the 2007 Number Cruncher Statistical System (NCSS) for Windows software program (NCSS, LLC, Kaysville, Utah, USA). In addition to using standard descriptive statistical calculations [mean and standard deviation (SD), median, and interquartile range), when the variables were normally distributed, an unpaired t test was used for group comparisons. However, when the variables were not normally distributed, the Mann-Whitney U test was utilized. In addition, a chi-square test was used to evaluate the qualitative data. Statistical significance level was established at p<0.05.

RESULTS

There was no mortality or major morbidity in either of the two groups in our study, but the mean CPB time in the MS group (56.7±14.6 min; range 40-80) was longer than in the RLMT group (42.2±12.7 mm; range 21-69) (p=0.0016) and the mean scar length (p<0.0001) in the patients in the MS group was also longer. Furthermore, the mean hospital stay in the RLMT group (5±1 days, range 4-7) was shorter than in the MS group (7.4±3.1 days, range 5-14) (p=0.019). Furthermore, no patient in the RLMT group needed to be converted to a full sternotomy or required an extension of the incision; however, one patient required the insertion of a chest tube due to pleural effusion on the third day after surgery. In addition, pericardial tube drainage was performed on one patient in the MS group on postoperative day 10 because of large pericardial effusion, and two patients in this same group also developed small-to-moderate pericardial

Table 3. Evaluation of the scars according to the Vancouver Scar Scale

Score	Pigmentation		Height of scar		Flexibility		Vascularity		Overall wound score			
	MS group	RLMT group	MS group	RLMT group	MS group	RLMT group	MS group	RLMT group	MS group	RLMT group		
	n	n	n	n	n	n	n	n	Mean range	Mean range		
0	4	3	–	–	8	8	8	6	4.5	2-7	3.5	1.25-6.25
1	3	2	8	9	4	3	2	3				
2	7	7	1	1	1	0	3	3				
3	–	–	5	2	1	1	1	0				
4	–	–	–	–	–	–	–	–				
P value	0.909		0.549		0.802		0.720		0.715			
Total	14	12	14	12	14	12	14	12	14		12	

MS: Median sternotomy; RLMT: Right lateral minithoracotomy.

effusion postoperatively, but this was resolved with anti-inflammatories. The ASD closure was successful in all of our patients, and the echocardiography performed on all of the patients before discharge showed no residual shunts. Moreover, we found no statistically significant differences related to the skin types of the two groups according to the Fitzpatrick skin type classification scale ($p=0.369$) (Table 1).

The VSS parameters were used to assess the burden of scarring, and we determined that the patients in both groups had similar opinions ($p=0.715$) (Table 3). In addition, none of the 26 patients presented with inflammation, infection, hematomas, or wound dehiscence. However, a hypertrophic scar was observed in five patients (35.7%) in the MS group and two (16.7%) in the RLMT group ($p=0.391$).

The difference in the total POSAS observer scale scores (the sum of the relief, pigmentation, flexibility, thickness, vascularity and surface scales) between the groups was not statistically significant (group MS; 14.6 ± 8 vs. group RLMT; 13.6 ± 7.9) ($p=0.74$), and the POSAS patient scale (itching and pain) also did not reach statistical significance ($p=0.74$). All of the POSAS values are given in Table 4.

Figure 2 shows a comparison between the PSS in the RLMT and MS groups, and the patient satisfaction regarding the cosmetic results was greater in the RLMT group (mean 1.92; range 1-3) than in the MS group (mean 2.86; range 2-4) ($p=0.021$). Furthermore, the satisfaction rate was 66% for the RLMT patients versus 42% for the MS patients, with none of the patients in latter group replying that they were very satisfied. Eight patients in the MS group stated they

had a cosmetically displeasing scar due to the MS, and this included those with the hypertrophic scars. In addition, six patients in the MS group and two in the RLMT group had a tendency toward concealing their scars.

The mean BIQ score for the patients in the MS group was 168.7 ± 19.5 , whereas it was 160.4 ± 14.8 for the RLMT group. However, this difference was not statistically significant ($p<0.241$) (Table 5).

The anxiety levels according to the HAM-A were higher in the RLMT group (10.0 ± 7.7) than in the MS group (5.8 ± 4.8), but the difference did not reach statistical significance ($p=0.099$) (Table 5). At the postoperative assessment, three patients (25%) in the RLMT group had scores indicative of anxiety while five (41.6%) had symptoms of mild anxiety, and four (33.3%) were mildly stressed. In comparison, eight patients (57.1%) in the MS group had scores indicative of anxiety while six (41.6%) had symptoms of mild anxiety.

DISCUSSION

The standard approach for most cardiac operations is a full-length sternotomy, but the vertical median skin scar associated with this procedure can cause psychological distress, especially among young patients.^[11] Because of the recent trend toward the use of minimal invasive techniques in cardiac surgery, we applied the VSS and PSS to our patients to obtain more objective data about the effectiveness of these techniques.

The majority of patients with ASDs are asymptomatic on presentation, and their functional as well as their psychological status are stable both preoperatively and postoperatively. Nevertheless, a series of factors can cause the development of a

Table 4. Patient and Observer Scar Assessment Scale results

	MS group (n=14)	RLMT group (n=12)	p
	Mean±SD	Mean±SD	
Observer scale	14.6±8.0	13.5±7.9	0.738
Relief	2.5±1.8	1.9±1.9	0.410
Pigmentation	3.1±1.8	3.3±1.8	0.826
Flexibility	1.5±1.3	1.8±1.4	0.631
Thickness	2.5±1.6	1.9±1.7	0.416
Vascularity	2.2±1.5	2.2±1.3	1
Surface	2.4±2.0	2.5±2.0	0.897
Patients scale			
Itching	1.3±1.0	1.2±0.6	0.857
Pain	1.3±1.0	1.1±0.3	0.627

MS: Median sternotomy; RLMT: Right lateral minithoracotomy; SD: Standard deviation; POSAS: Patient and Observer Scar Assessment.

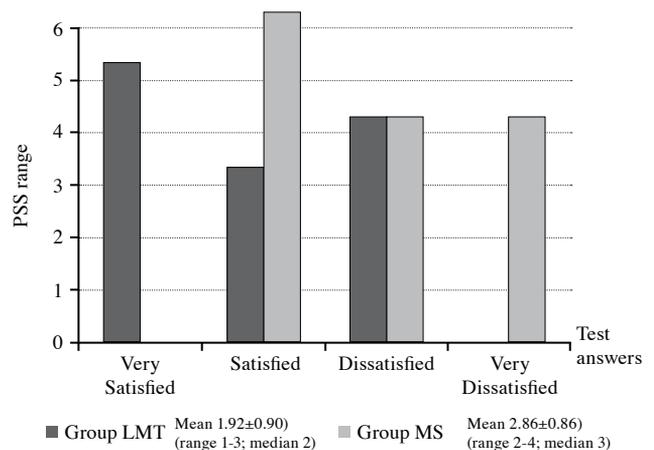


Figure 2. Patient Satisfaction Scores by groups ($p=0.021$). LMT: Lateral minithoracotomy; MS: Median sternotomy.

Table 5. Hamilton Anxiety Rating Scale and Body-Image Ideals Questionnaire results

	Mean±SD	<i>p</i>	Median	<i>p</i>	Range
HAM-A		0.099		0.241	
MS group	5.8±4.8		4.50		1-14
RLMT group	10.0±7.7		8.00		2-25
BIQ		0.099		0.241	
MS group	168.7±19.5		173.00		132-193
RLMT group	160.4±14.8		163.50		138-182

HAM-A: Hamilton Anxiety Rating Scale; BIQ: Body Image Questionnaire; SD: Standard deviation; MS: Median sternotomy; RLMT: Right lateral minithoracotomy.

negative body image in the postoperative period. The effects of body image and physical characteristics on psychological functioning are particularly important during childhood and adolescence. As expected, the MS procedure leaves a large scar, so these individuals are still faced with adapting to lifestyle changes because they may want to cover their unsightly scars. In spite of the similar body image levels between the two groups in our study, the patients in the MS group may have had a negative body image. During the interview, we asked all of the patients what they preferred to wear when going out socially, and many in the MS group said that they found it difficult to talk about their disease because of their scars. Moreover, the patients in the MS group were afraid to reveal their disease to others. In contrast, the patients in the RLMT group were able to camouflage their scars more easily because they were less visible. One patient in the MS group even stated that “if you want to camouflage the scar, you have to concentrate on one thing all the time, which is hiding the scar.” With this logic, surgeons, patients, and parents should keep in mind the psychological impact on the patients when choosing the most appropriate surgical technique.

For many surgeons a lateral thoracotomy presents the best access choice for repairing simple cardiac defects.^[12] Not only does this technique lead to higher patient satisfaction and improved cosmetic results, but it can also provide the rapid increase in the number of catheter-based procedures in cardiac surgery. In fact, various kinds of minimally invasive procedures are now preferable to the conventional techniques. Transcatheter device occlusion is usually preferred by both patients and parents because of the obvious advantages of minimal access in terms of low morbidity rates, cosmetic results with hidden scars, and shorter hospital stays.^[13] In contrast, the feasibility of percutaneous closure for very large defects is less clear.^[14] Percutaneous closure of secundum-type ASDs may be associated with device malposition and migration as well as increased procedural and

fluoroscopy times.^[15] In adults, ASD repair can also be achieved via robotic assistance,^[16] but the use of robotic-enhanced repair of ASDs is currently very limited in children.^[17] Therefore, we prefer access through the RLMT for patients with ASDs who are not suited for percutaneous closure. Even if the sternum is split completely in this technique, the scar can be significantly shorter than with a conventional sternotomy because of the minimal skin incision. This approach can also provide significant, positive aesthetic outcomes.^[18,19]

The sternal skin, shoulders, and upper arms are more susceptible to abnormal wound responses (keloids and hypertrophic scars), with keloids being more common during puberty because of elevated hormone levels.^[20,21] Also, those with darker skin are more likely to have keloids. The majority of the patients in the MS group in our study had Fitzpatrick skin types 3 and 4. Jina and Simcock^[22] showed that MS scarring can be problematic with hypertrophic scars are present, and Truong et al.^[23] reported that the scarring is worse in the chest wall than in other regions. In our study, no keloid formation was observed in any of the patients, and the incidence of hypertrophic scars was higher in the MS group (35.7%) than the RLMT group (16.7%) ($p=0.391$).

After puberty, chest hair can make the scars less noticeable in male patients, which could explain why female patients have higher rates of dissatisfaction than males with respect to their own MS scars.^[11] In our study, three patients were dissatisfied and one was very dissatisfied with their scars in the MS group; hence, patient dissatisfaction with regard to scarring should be taken into consideration when choosing the best surgical procedure because it can be difficult to manage the postoperative psychological trauma that may occur with this procedure.

Late complications, such as uneven breast development and scoliosis, might also negatively impact body image and other PSS. For example, an

anterolateral incision may cause breast asymmetry because it crosses the future breast line.^[21] However, the incision associated with the RLMT technique is on the lateral side and never reaches the anterior axillary line. Thus, the likelihood of breast asymmetry in the future is much lower. In addition, the development of scoliosis after a thoracotomy could be a concern as the children grow older;^[24] therefore, long-term follow-up of these patients after this type of procedure should be encouraged.^[25]

The surgical ASD closure via either the RLMT or MS method requires CPB. Indeed, we found that our approach was almost identical to MS with respect to surgical management and the challenges that were faced. Although a minithoracotomy requires complex technical skills, we performed all steps of the RLMT procedure via a small opening using standard surgical instruments. In general, the mean procedure time for both techniques was similar, but the mean CPB time of 42 minutes demonstrates that the RLMT technique can be accomplished within a reasonable time. Additionally, the hospital stays were significantly shorter in the RLMT group in our study. However, it should be noted that the echocardiographic follow-up of the patients with pericardial effusion in the MS group might have been responsible for the prolonged hospital stays in that group.

The length of the RLMT skin incision is nearly half the size of the incisions associated with the MS procedure, but a thoracotomy does involve multiple muscle layers and continuous movement as the patient breathes.^[24] Hence, muscle tension may cause stress and pain in these patients, and the patients who undergo a thoracotomy may experience more pain in the early postoperative period than those who undergo the MS procedure. Because of this likelihood, at our facility, we usually inject some local anesthetic solution in the patients who underwent the RLMT procedure to produce an intercostal block at the end of the procedure with the goal of effectively alleviating or reducing the pain in the hours after the surgery.

Our results showed that the opinions of the two groups with regard to body image were similar. One possible explanation for this is that the patients might have been focused more on survival than on the cosmetic and psychological outcomes. Nevertheless, many studies have reported increased patient gratification with the overall appearance of their scars when thoracotomies were used to close ASDs, although these findings have not been supported by any patient surveys or interviews.^[25]

Draaijers et al.^[26] reported that the POSAS is a more suitable, reliable, and complete scar evaluation tool than the VSS, but we found that the VSS and POSAS yielded similar wound characteristics and produced comparable results. However, the incidence of unpleasant hypertrophic scar formation in our study was higher in the patients with MS.

Our study had some limitations. The research was carried out on a small set of patients (n=26), and the sample group was predominantly male (78.6%) in the MS group. In addition, we did not take into account women's concerns regarding cosmetic incisions before deciding on the incision site. In spite of this, our patients underwent a gender-differentiated surgical approach completely incidentally. Furthermore, in order to study the cosmetic effects, it might not be necessary to study only ASD closure. Moreover, studying males and females separately as well as children and teenagers might be useful because these groups might have different perceptions related to cosmetic appearance and body image satisfaction. Hence, there is a need for further studies to explore these topics with patients of a similar age and gender.

Conclusion

Our results revealed that patients who undergo the RLMT procedure are more satisfied with their scars. Although the two groups in our study had similar opinions regarding the appearance of their scars and their features, the more preferable incision site in the RLMT procedure should be taken into consideration when planning the surgical treatment. The RLMT approach is beneficial for all patients with ASD, especially those who want to keep their surgery a secret. We hope that our findings contribute to the search for the most appropriate technique for ASD closure and look forward to newer, improved surgical techniques in the future.

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