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ARTICLE

Surgical Repair of Pectus Excavatum Markedly Improves Body Image and Perceived Ability for Physical Activity: Multicenter Study

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What's Known on This Subject

A pilot study suggested that body image and perceived exercise ability are diminished with pectus excavatum.

What This Study Adds

For a large number of patients, adversely affected body image and perceived exercise ability were improved after surgery.

ABSTRACT

OBJECTIVE. This study evaluated changes in both physical and psychosocial quality of life reported by the parent and child after surgical repair of pectus excavatum.

METHODS. As part of a multicenter study of pectus excavatum, a previously validated tool called the Pectus Excavatum Evaluation Questionnaire was administered by the research coordinator, via telephone, to parents and patients (8–21 years of age) before and 1 year after surgery. Eleven North American children's hospitals participated. From 2001 to 2006, 264 patients and 291 parents completed the initial questionnaire, and 247 patients and 274 parents completed the postoperative questionnaire. Responses used a Likert-type scale of 1 to 4, reflecting the extent or frequency of a particular experience, with higher values conveying less-desirable experience.

RESULTS. Preoperative psychosocial functioning was unrelated to objective pectus excavatum severity (computed tomographic index). Patients and their parents reported significant positive postoperative changes. Improvements occurred in both physical and psychosocial functioning, including less social self-consciousness and a more-favorable body image. For children, the body image component improved from 2.30 ± 0.62 (mean ± SD) to 1.40 ± 0.42 after surgery and the physical difficulties component improved from 2.11 ± 0.82 to 1.37 ± 0.44. For the parent questionnaire, the child's emotional difficulties improved from 1.81 ± 0.70 to 1.24 ± 0.36, social self-consciousness improved from 2.86 ± 1.03 to 1.33 ± 0.68, and physical difficulties improved from 2.14 ± 0.75 to 1.32 ± 0.39. Ninety-seven percent of patients thought that surgery improved how their chest looked.

CONCLUSIONS. Surgical repair of pectus excavatum can significantly improve the body image difficulties and limitations on physical activity experienced by patients. These results should prompt physicians to consider the physiologic and psychological implications of pectus excavatum just as they would any other physical deformity known to have such consequences. *Pediatrics* 2008;122:1218–1222

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This trial has been registered at www.clinicaltrials.gov (identifier NCT 00236132).

Key Words
pectus excavatum, Nuss procedure, open procedure, Ravitch procedure, outcomes research, comparative study, body image, exercise capacity, multicenter study, quality of life

Abbreviations
PE—pectus excavatum
PEEQ—Pectus Excavatum Evaluation Questionnaire

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PATIENTS WITH PECTUS excavatum (PE) frequently complain of decreased ability to perform prolonged or rigorous cardiovascular work, relative to their classmates. A large proportion of patients with PE are self-conscious about their chests. Children and adolescents with potentially visible physical differences may be at risk for body image and

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interpersonal difficulties.[1] We sought to quantify both physical and psychosocial functioning with psychometrically sound assessments and to detect the effects of surgical correction of PE on both.

Although PE is a common chest wall disorder (prevalence of 1 case per 400 individuals to 1 case per 1000 individuals in the United States[2]), rigorous study of the effects of the disease on perceived ability for physical activities and on body image has been infrequent. In conjunction with a multicenter study of PE repair, the systematic administration of a condition-specific psychosocial tool was used to evaluate such outcomes. This report presents the results of those evaluations.

METHODS

A multicenter study of PE involving 11 pediatric centers in North America screened 416 patients during a 5-year period from August 2001 to August 2006.[3] Institutional review boards at all participating institutions approved the study. Inclusion criteria included patients between 3 and 21 years of age with a computed tomographic index (from thoracic computed tomography) of ≥3.2.[4] The protocol included both written informed consent from the parent or guardian and assent from the child, according to the procedures of the local institutional review boards. Patients were excluded if any of the following applied: pectus carinatum; Poland syndrome or other complex chest wall anomaly; previous PE repair with any technique; previous thoracic surgery; congenital heart disease; bleeding dyscrasia; history of major anesthetic risk factors, such as malignant hyperthermia; or pregnancy.

Of the patients initially screened, 26 patients or their parents did not give consent, and 36 patients were initially or later found to be ineligible according to the protocol. Moreover, 21 patients did not undergo surgery or underwent surgery at a hospital other than those included in the study; 3 patients did not undergo exercise testing during the final time period, when only patients with cardiopulmonary exercise studies were being enrolled; 3 patients had variations in operative procedures that made them ineligible; and 1 patient underwent spinal surgery within 1 year after surgery for PE repair. A total of 90 patients were excluded from the psychosocial study, leaving 326 eligible patients; 283 patients were treated with the newer Nuss surgical procedure, and 43 underwent the open (Ravitch) operation. Various physiologic, operative, postoperative complication, and pain measures were sought from all patients. Data were maintained in a secure central database.

The ages of participating patients in the larger study ranged from 4 to 21 years, with the majority of patients (63%) being between the ages of 13 and 17 years. An additional 19% of participants were between the ages of 8 and 12 years, and 11% were ≥18 years of age. Because of questionnaire limitations, 23 patients <8 years of age were not included in this psychosocial study. Finally, 85% of the participants were male, which is consistent with the PE male/female ratio of 4:1. Ninety-five percent of participants were white, 2.4% Hispanic, 1.5% Asian, 0.9% black, and 0.3% Pacific Islander. The median computed tomographic index was 4.4.[3]

One component of the assessment was administration of a previously validated psychosocial assessment, the Pectus Excavatum Evaluation Questionnaire (PEEQ).[5] The PEEQ consists of both preoperative and postoperative telephone questionnaires, with versions for patients and their parents. The questionnaires were developed by a psychologist and a group of clinical experts with years of experience with this disorder of the chest wall. Responses were given by using a Likert-type scale from 1 to 4, reflecting the extent or frequency of a particular experience. Higher values on the response scale indicate a less-desirable experience (eg, 4 = very unhappy and 1 = very happy). This assessment was administered via telephone by the clinical research coordinator for the multicenter study.

All consenting parents, as well as patients 8 to 21 years of age, were contacted before and 1 year after surgical repair of PE. The same parent who completed the preoperative survey completed the postoperative survey. Attempts to contact 303 age-eligible patients and 326 parents resulted in preoperative survey completion by 264 patients and 291 parents (ie, completion rates of 87% and 89%, respectively). Of those with pretest results, posttest surveys were answered by 247 patients and 274 parents (ie, 94% compliance). The majority of noncompleters could not be reached by telephone.

RESULTS

Preliminary data screening examined item distributions for psychometric acceptability (eg, range, normality, and missing data). To derive empirical aggregate/composite scores, a principal-components analysis (using Promax oblique factor rotation) was conducted for each assessment (patient and parent) and occasion (before and after surgery). This data reduction analysis revealed 2 components for both pretests and posttests for the patients' questionnaire and 3 components per occasion for the parents' questionnaire. The content of the 2 components for patients pertained to (1) body image functioning attributable to PE (7 items, ie, feelings about looks in general and about looks without a shirt, self-consciousness and personal bother about chest, hiding chest, feelings about self attributable to chest, and feelings about spending the rest of life with chest as it currently looks) and (2) physical difficulties attributable to PE (4 items, ie, trouble exercising, chest pain or discomfort, shortness of breath, and fatigue). The 3 components for the questionnaire on parents' perceptions were (1) emotional difficulties attributable to PE (4 items, ie, reports of child's irritability, frustration, sadness/depression, and restlessness), (2) social self-consciousness (3 items, ie, reports of child's hiding of chest, reluctance to wear a bathing suit, and reluctance to change clothes in front of others), and (3) physical difficulties (4 items, ie, reports of child's trouble exercising, chest pain, shortness of breath, and fatigue). These results are comparable to the structures reported by Lawson et al.[5] Cronbach's α coefficients were used to evaluate the multi-item component

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TABLE 1 **Child PEEQ Results**

Component	Preoperative		Postoperative				
	Score, Mean ± SD	Cronbach's α	Score, Mean ± SD	Cronbach's α	t	P	Effect Size
Body image	2.30 ± 0.62	.85	1.40 ± 0.42	.85	22.77	<.0001	1.70
Physical difficulties	2.11 ± 0.82	.85	1.37 ± 0.44	.73	15.17	<.0001	1.12

scores and confirmed their acceptable internal consistencies, as reported in Tables 1 and 2.

Because posttest data were not provided by 17 parents and 17 patients who had completed pretests, attrition analyses (t tests) were performed. There were no significant pretest differences between those who did and those who did not complete a posttest.

To examine preoperative to postoperative changes in the 5 composite scores, t tests for correlated measures were conducted. One year after surgery, the patients reported significant reductions in body image concerns and reductions in difficulties in physical functioning (Table 1). Parents perceived significant improvements in their child's PE-related emotional functioning, social self-consciousness, and physical functioning (Table 2). All standardized effect sizes were very large (Cohen's d values ranged from 1.02 to 1.75) (Tables 1 and 2).

Gender comparisons indicated that the only PEEQ item significant at the .01 level (χ^2 test) was how often the patient was bothered by his or her chest. Before surgery, 68% of female patients and 40% of male patients were bothered by their chests often or very often. One year later, only 6% of female patients and 4% of male patients were bothered by their chests often or very often.

In posttest PEEQ items not included in the composite scores, we found that 97% of patients thought that surgery had improved how their chests looked. Moreover, 90% were either happy or mostly happy that they had undergone surgery. Before surgery, 79% of parents were often or very often concerned about their child's PE. One year after surgery, only 16% of parents reported such concern.

On the basis of Pearson correlations, there was no significant relationship between the pectus severity index determined from computed tomographic scans and the presurgical composite scores of either the patient or parent surveys. For the patient survey, the correlations between the severity index and the physical and body image components were 0.01 and 0.06, respectively. For the parent survey, the correlations between the 3 components and the severity index ranged from 0.00 to 0.06. These negligible correlations indicate that the objective severity of PE is unrelated to physical or psychosocial difficulties.

To evaluate whether the Nuss and Ravitch procedures produced differential psychosocial outcomes, a 2 (surgery type) × 2 (before/after) analysis of variance was conducted for each of the 5 outcome variables. Analyses confirmed significant psychosocial improvements independent of surgery type. A significant interaction effect occurred for only one measure, parental perceptions of the child's emotional difficulties associated with PE ($F_{1,271} = 10.50$; $P < .01$). However, this effect was attributable to a pretest and not a posttest difference between groups. Parents anticipating that their child would undergo the open surgical procedure perceived higher pretest levels of child emotional difficulties. Both groups exhibited significant improvements ($P < .0001$) in this dimension at the 1-year assessment.

DISCUSSION

Patients with PE are frequently dismissed by pediatricians as having an inconsequential problem. Pediatricians often tell parents that the chest wall deformity is "only cosmetic." For this reason, they are often denied the opportunity for surgical correction of the problem. In this multicenter study, we wish to establish not only that repair can be conducted in a variety of centers, with no deaths and very low morbidity rates,[3] but also that the condition itself is not trivial in its effect on the life of the child.

Perceived inability for physical activities can be affected by many things, including disease at the cellular level, such as mitochondrial disease; neurologic, muscular, or combined neuromuscular illness; poor cardiac function; limitation of lung function; and psychological conditions, such as anxiety and depression. Progress being made in exercise testing of children illustrates that these problems are operative for different groups of patients.[6–8] In this investigation, geographically dispersed children and parents demonstrated a marked effect of the chest deformity on perceived ability to exercise, which was consistently improved with surgical correction.

TABLE 2 **Parent PEEQ Results**

Component	Preoperative		Postoperative				
	Score, Mean ± SD	Cronbach's α	Score, Mean ± SD	Cronbach's α	t	P	Effect Size
Emotional difficulties	1.81 ± 0.70	.82	1.24 ± 0.36	.69	13.65	<.0001	1.02
Social self- consciousness	2.86 ± 1.03	.90	1.33 ± 0.68	.90	23.03	<.0001	1.75
Physical difficulties	2.14 ± 0.75	.78	1.32 ± 0.39	.65	18.59	<.0001	1.37

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It is no secret that body image concerns bring many children to a surgeon.[9–12] The importance of these concerns to the child and family is often underestimated by pediatricians.[13] Repair of PE is readily accomplished during the teenage years, when skeletal growth is near maturity. It is precisely in this decade, in adolescence, when many individuals are most concerned with body image. At the age when patients need to establish existence independent from their parents, gain peer acceptance, choose a life's work, and begin the process of dating or choosing a mate, they are afflicted with a deformity that diminishes their ability to do those things.

The lack of correlation between the anatomic severity of the depression and the PEEQ scores suggests that the mere presence of the deformity, regardless of its severity, produces body image and psychosocial difficulties. Studies have shown that burn patients experience similar body image distress regardless of the total body surface area of the injury.[10] Similarly, patients with only minor facial lacerations can experience significant anxiety and self-consciousness.[11] Similar conclusions have been reached in patient populations with a variety of appearance-altering or disfiguring conditions.[14,15] Psychological research concerning patients with disfigurement of a visible or potentially visible part of the body has shown that the disfigurement often causes disturbances of the body schema and alters the individual's self-representation.[11] Therefore, physicians' use of anatomic severity criteria to discern the patients' "need" for surgical repair is no substitute for understanding the psychosocial impact of PE as experienced by the patients themselves or their parents.

This method of seeking to determine the patients' and parents' perceptions of the physical and psychological effects of the deformity and its repair used scientifically sound assessments. Questions were not asked by the surgeon or anyone treating the patient, timing of administration was carefully controlled, and proper statistical analyses were conducted. Data and conclusions pertain only to the studied population of patients with severe PE who sought and underwent surgical treatment. The significant quality-of-life improvements perceived in both physical and psychosocial functioning should encourage physicians to approach PE repair in the same manner as they do treatment of other deformities that have a deleterious impact on the physical and psychological well-being of the individual.

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REFERENCES

1. Rumsey N, Harcourt D. Body image and disfigurement: issues and intervention. *Body Image.* 2004;1(1):83–97
2. Chung CS, Myrianthopoulos NC. Factors affecting risks of congenital malformations, part I: analysis of epidemiologic factors in congenital malformations: report from the Collaborative Perinatal Project. *Birth Defects Orig Artic Ser.* 1975;11(10):1–22
3. Kelly RE Jr, Shamberger RC, Mellins RB, et al. Prospective multicenter study of surgical correction of pectus excavatum: design, perioperative complications, pain, and baseline pulmonary function facilitated by Internet-based data collection. *J Am Coll Surg.* 2007;205(2):205–216
4. Lawson ML, Barnes-Eley, Burke BL, et al. Reliability of a standardized protocol to calculate cross-sectional chest area and severity indices to evaluate pectus excavatum. *J Pediatr Surg.* 2006;41(7):1219–1225
5. Lawson ML, Cash TF, Akers R, et al. A pilot study of the impact of surgical repair on disease-specific quality of life among patients with pectus excavatum. *J Pediatr Surg.* 2003;38(6):916–918
6. Cooper DM, Nemet D, Galassetti P. Exercise, stress and inflammation in the growing child: from the bench to the playground. *Curr Opin Pediatr.* 2004;16(3):286–292
7. Eliakim A, Scheett T, Allmendinger N. Training, muscle volume, and energy expenditure in nonobese American girls. *J Appl Physiol.* 2001;90(1):35–44
8. Cooper DM, Mellins RB, Mansell AL. Changes in distribution of ventilation with lung growth. *J Appl Physiol.* 1981;51(3):699–705
9. Cucchiaro G, Farrar JT, Guite JW, Li Y. What postoperative outcomes matter to pediatric patients? *Anesth Analg.* 2006;102(5):1376–1382
10. Lawrence JW, Fauerbach JA, Heinberg L, Doctor M. Visible vs hidden scars and their relation to body esteem. *J Burn Care Rehabil.* 2004;25(1):25–32
11. Tebble NJ, Thomas DW, Price P. Anxiety and self-conscious-

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ness in patients with minor facial lacerations. *J Adv Nurs.* 2004;47(4):417–426
12. Robert J, Hayashi A, Anderson JO, Martin JM, Maxwell LL. Quality of life of patients who have undergone the Nuss procedure for pectus excavatum: preliminary findings. *J Pediatr Surg.* 2003;38(5):779–783
13. Wheeler R, Foote K. Pectus excavatum: studiously ignored in the United Kingdom? *Arch Dis Child.* 2000;82(3):187–188
14. Moss TP. The relationships between objective and subjective ratings of disfigurement severity, and psychological adjustment. *Body Image.* 2005;2(2):151–159
15. Ong J, Clarke A, White P, Johnson M, Withey S, Butler PEM. Does severity predict distress? The relationship between subjective and objective measures of appearance and psychological adjustment, during treatment for facial lipoatrophy. *Body Image.* 2007;4(3):239–248

NEUROLOGY OF THE NEWBORN, 5TH EDITION*

Author: Volpe, Joseph J., MD
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Reviewer: Jay Goldsmith, MD (Tulane University School of Medicine)
DESCRIPTION: This is the fifth edition of the classic textbook considered the gold standard in neonatal neurology. Authored solely by world authority Joseph J. Volpe, this edition extensively revises and updates the previous edition published in 2001. The author combines basic science with clinical experience to produce a readable and valuable reference that is used by healthcare providers as well as the legal community as the authoritative source in determining the etiology of neonatal brain injury.
PURPOSE: According to the author, the book is intended as a "systematic, readable and comprehensive synthesis of the neurology of the newborn that will be of value to all individuals who care for the infant." In fact, the wide spectrum of the book, from the development of the nervous system to clinical aspects of various disorders, will have unique appeal to different readers.
AUDIENCE: Although intended for the broad audience of all neonatal healthcare providers, the book is written at a level appropriate for neonatologists and pediatric neurologists and their trainees. Although not noted in the preface, the book has found great popularity in the legal community as the go-to reference in brain-damaged baby lawsuits. The author, a professor of pediatric neurology at Harvard, is an internationally known authority in the field.
FEATURES: The book follows the same format of 10 units used in all previous editions. The first four chapters deal with the development of the nervous system, the clinical neurologic examination, and specialized techniques in neurologic evaluation. The next 20 chapters deal with neonatal seizures and other neurologic disorders. The text is readable and the coverage is encyclopedic and well referenced. The author uses tables to great advantage for teaching and has included over 500 in this edition. The figures, especially the brain imaging, are clear and well annotated for nonradiologists. With over 12 000 references, the book is certainly evidence-based. Having a single author adds consistency, but limits opposing opinions in many of the controversial area.
ASSESSMENT: As the premier text in this field, this book has no equal. It should be available in every hospital library that has a pediatric department and available to every neonatal intensive care unit provider. While other general pediatric neurology books have sections on neonatal neurology (i.e., Swaiman et al., Pediatric Neurology: Principles and Practice, 4th edition (Elsevier, 2006), Menkes et al., Child Neurology, 7th edition (Lippincott Williams & Wilkins, 2006), Maria, Current Management in Child Neurology, 3rd edition (BC Decker, 2005)), none has the unique focus, depth, or broad range of pathophysiologic discussion that this one does. Given the rapid proliferation of information in this field, including new types of brain imaging and evaluation, this fifth edition is a welcome and necessary revision of previous editions.

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