(4) Patients

The study is divided into two sections, considering patients before and after ASD closure and patients after TOF correction . Each group has a parallel normal control group.

4.1 Right atrial and right ventricular function in patients before and after ASD closure (section 1)

Thirty patients [median age 22 (2-70) years] with secundum type ASD before and 1 week after surgical closure (n=11) or closure with an Amplatzer Septal Occluder (ASO) (n=19) and 30 age matched healthy controls [median age 11 (1-62) years] were included in the study. The inclusion criteria for ASD patients was that they had sinus rhythm at the time of examination. The demographic characteristics of all the patients studied are shown in table 1 and figure 1. The normal controls were examined for innocent murmur and cardiac malformation and altered function was excluded. The indications for catheter ASD closure were: 1) ASD diameter less than 36 mm; 2) the presence of sufficient rim of tissue surrounding the defect; 3) no sinus venous defect. The median defect diameter measured by 2-dimensional echocardiography was 2.7 (1.7-3.5) cm in the surgical group and 1.8 (0.6-3.4) cm in the catheter group. The median (range) Qp/Qs measured by the Fick method was 2.0 (1.3-5.2) in the surgical group and 1.7 (1.3-3.0) in the catheter group. Detailed comparison of the general ASD characteristics between the two closure groups

is shown in table 2. Informed consent was obtained from the patients of the study group or from their parents.

Table 1 Characteristics of the patients before ASD closure

Parameters	Median (Range)
Age (years)	22 (2-70)
ASD diameter (cm)	2.2 (0.6-3.5)
Qp / Qs	1.9 (1.3-5.2)
Mean right atrial pressure (mmHg)	2 (0-8)
Right ventricular systolic pressure (mm Hg)	28 (18-54)
Right ventricular end-diastolic pressure (mmHg)	4 (1-8)
Mean left atrial pressure (mm Hg)	4 (0-10)

ASD: secundum type atrial septum defect; Qp/Qs: ratio between pulmonary flow and systemic flow

Table 2 Comparison of the general characteristics of surgical (n=11) and catheter (n=19) ASD closure groups

	Surgery Median (range)	Catheter Median (range)	p
Age (years)	21 (2-68)	30 (2-70)	NS
Heart rate before closure (bpm)	84 (68-126)	79 (58-123)	NS
ASD diameter (cm)	2.7 (1.7-3.5)	1.8 (0.6-3.4)	0.012
Qp/Qs	2 (1.3-5.2)	1.7 (1.3-3)	0.068
Mean right atrial pressure (mmHg)	2 (0-8)	2(0-8)	NS
Right ventricular systolic pressure (mm Hg)	28 (19-54)	28 (18-34)	NS
Right ventricular diastolic pressure (mmHg)	5 (2-7)	4 (1-8)	NS
Mean left atrial pressure (mm Hg)	4 (2-10)	4 (0-10)	NS

ASD: secundum type atrial septum defect; bpm: beats per minute; Qp/Qs: ratio between pulmonary flow and systemic flow

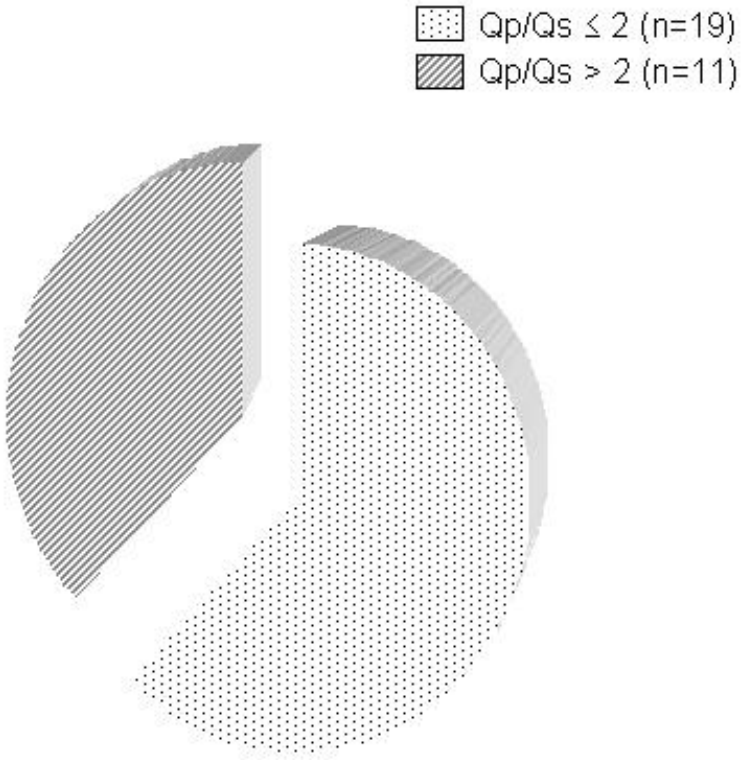

Figure 1 The ratio between pulmonary and systemic blood flow in the studied patients before ASD closure

ASD: secundum type atrial septal defect; Qp/Qs: the ratio between pulmonary and systemic blood flow

4.2 Right atrial and right ventricular function in patients following corrective surgery of tetralogy of Fallot (section 2)

Fifty patients following corrective surgery of tetralogy of Fallot (TOF) and 30 age-matched normal subjects were included in this study. The patients were asymptomatic and were selected on the basis that they had no patent foramen ovale or residual ventricular septal defect and that they had sinus rhythm and an adequate transthoracic window for echocardiographic examination. Their characteristics are shown in table 3 and figures 2-4. The median age at corrective repair was 3 years, with a range from 4 months to 51 years, and median age at examination was 12.7 years, with a range from 6 to 56 years. The follow-up period was 7.5 years, with a range from 1 to 28 years. During surgical repair the right ventricular outflow tract was reconstructed with a valved homograft or heterograft in 26 patients (52%) and with a transpulmonary annular patch or non-transannular technique in 24 patients (48%). Data from the TOF group were compared with those from 30 age-matched healthy subjects, who were examined for innocent murmur. Their median age was 13.5 years, with a range from 6 to 62 years. Among the 50 TOF patients, 20 underwent a magnetic resonance tomography examination in order to quantify the right ventricular systolic function. Informed written consent was obtained from the patients or their parents. The patients included in the magnetic resonance tomography studies were those who agreed to undergo the examination on the same day as the echocardiographic study.

Table 3 Characteristics of the patients after corrective surgery of tetralogy of Fallot (n=50)

Parameter	Median (range) or Case number (percentage)
Age (years)	12.7 (6-56)
Age at operation (years)	3 (0.3-51)
Follow-up period (years)	7.5 (1-28)
Type of right ventricular outflow reconstruction:	
Homograft or heterograft	26 (52%)
RVOT transannular patch or other methods	24 (48%)
Gradient across RVOT measured by echocardiography:	
≥ 40 mmHg	14 (28%)
< 40 mmHg	36 (72%)
Pulmonary regurgitation grade: mild to moderate	44 (88%)
severe	6 (12%)

RVOT: right ventricular outflow tract

Right atrial function in patients after TOF correction

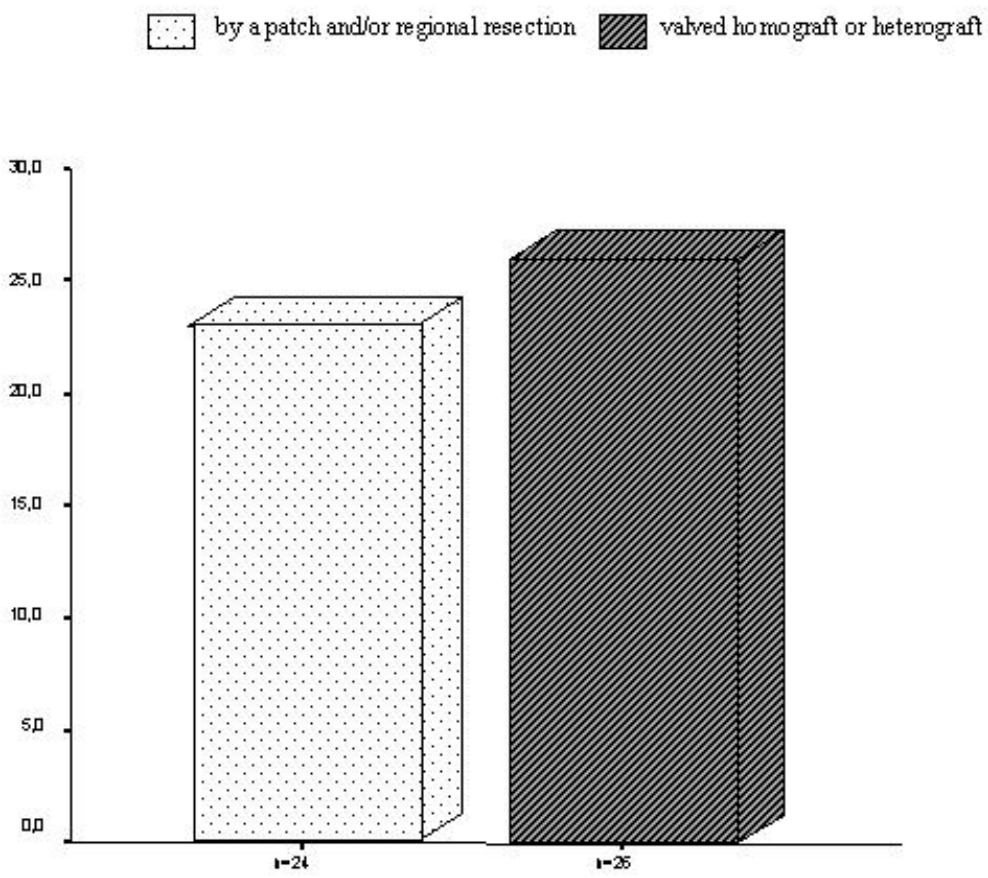

Figure 2 The right ventricular outflow tract (RVOT) in the studied patients was reconstructed with a valved homograft/heterograft or a patch and/or regional resection

RVOT: right ventricular outflow tract; TOF: tetralogy of Fallot

Right atrial function in patients after TOF correction

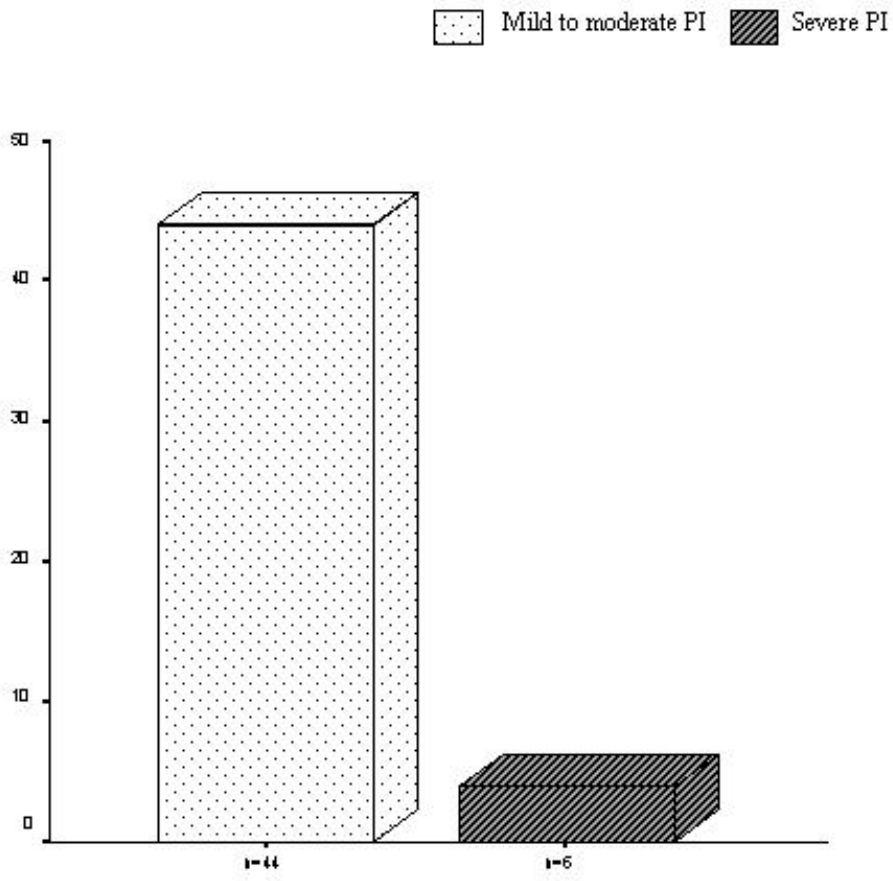

Figure 3 The degree of pulmonary insufficiency (PI) in the studied postoperative patients

PI: pulmonary insufficiency; TOF: tetralogy of Fallot

Right atrial function in patients after TOF correction

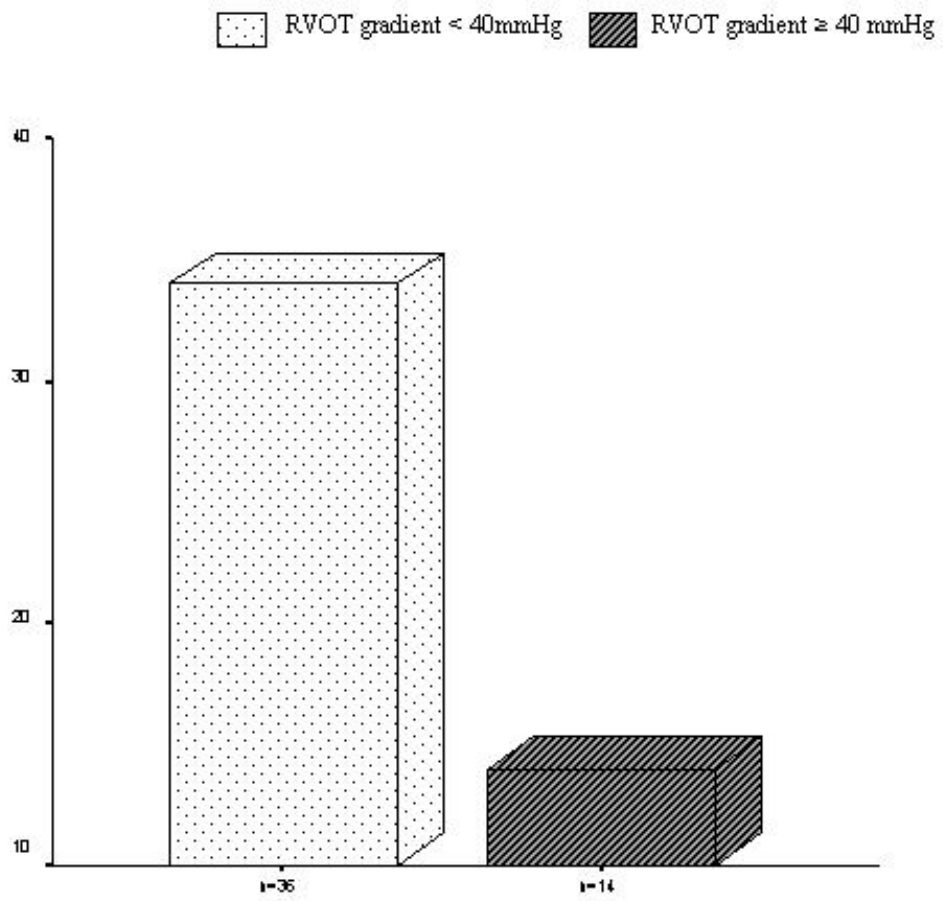

Figure 4 The gradient across the RVOT in TOF patients following corrective surgery of TOF. Applying current surgical techniques for repair of TOF the residual stenosis is minimal (less than 40 mmHg) in the majority of examined patients.

RVOT: right ventricular outflow tract; TOF: tetralogy of Fallot