Allogeneic PG, as opposed to autologous PG, is preferred because it can be obtained from young and healthy donors, providing a high dose of functioning platelets with minimal risk of bacterial contamination.

This is the first published report, to our knowledge, of treating DSWI by means of injection of allogeneic PG. Considering the disappointing results seen with the surgical treatment of DSWI, especially for high-risk patients, nonsurgical therapy consisting of a combination of biologic (PG) and mechanical (VAC) methods might be advantageous as a simple, inexpensive, and safer therapy.

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Right ventricular reverse remodeling is possible despite twenty-one years of absent tricuspid valve and severe right ventricular failure

Ramohan Marla, MD, Judy Fox, RNP, Raymond Q. Migrino, MD, Lee Biblo, MD, and R. Eric Lilly, MD, Milwaukee, Wis

Recovery of impaired right ventricular (RV) function after tricuspid valve (TV) replacement for long-standing chronic tricuspid regurgitation is not predictable. Poor preoperative RV function and enlarged RV dimensions are not always reversible after TV replacement. We report a case of complete return to normal of RV dimensions and function after TV replacement for severe tricuspid regurgitation of 21 years' duration.

CLINICAL SUMMARY

A 48-year-old woman with history of TV excision at another institution 21 years previously for staphylococcal endocarditis was admitted with class IV heart failure. During the ensuing 5 years, she had progressively worsening functional status and finally was seen with overt right heart failure in atrial flutter with ascites and pleural effusions. A transthoracic echocardiogram revealed a small left ventricle with leftward displacement of the interventricular septum, severely dilated RV with diminished RV systolic function, and absent TV (Figure 1, A–C). Right heart catheterization revealed Fick-derived cardiac index of 1.57 L/

(min/m²), pulmonary vascular resistance of 3.86 Wood units, and pulmonary capillary wedge pressure of 19 mm Hg. No coronary artery disease was noted on left heart catheterization.

A 33-mm St Jude Biocor porcine valve (St Jude Medical, Inc, St Paul, Minn) was sutured into the tricuspid position by way of a resternotomy. Midrange inotropic support without nitric oxide was required for successful weaning from cardiopulmonary bypass. Cardiac index gradually improved, and the patient was discharged home on postoperative day 14 in normal sinus rhythm. A transthoracic echocardiogram obtained 6 months after surgery demonstrated RV reverse remodeling with improved left ventricular geometry (Figure 1, D–F) and normal RV dimensions, as defined by the American Society of Echocardiography¹ (Table 1). At 6 months, the patient had no signs of heart failure and nearly normal exercise tolerance.

TABLE 1. Right ventricular chamber dimensions preoperatively and at 6 postoperative months of follow-up

Measurement	Reference range (cm)	Preoperative (cm)	Follow-up (cm)
Right ventricular basal diameter	2–2.8	5	2.8
Mid right ventricular diameter	2.7–3.3	3.5	3.2
Base to apex length	7.1–7.9	7.5	7.2
Above aortic valve	2.5–2.9	5.6	4.4
Above pulmonic valve	1.7–2.3	2.7	2.1

Measurements and reference ranges were obtained according to standard American Society of Echocardiography recommendation.¹

From Medical College of Wisconsin, Milwaukee, Wis.

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Address for reprints: R. Eric Lilly, MD, Medical College of Wisconsin, Cardiothoracic Surgery, Froedtert East, Suite 5700, 9200 W Wisconsin Ave, Milwaukee, WI 53226 (E-mail: relilly@mcw.edu).

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FIGURE 1. A through C, Preoperative transthoracic echocardiography views demonstrating dilated right ventricle (RV) with small left ventricle (LV) and flattened interventricular septum (*arrowhead*). D through F, Six-month postoperative echocardiography in parasternal long axis (D), parasternal short axis (E), and apical 4-chamber (F) views showing bioprosthetic tricuspid valve (TV). There was dramatic reduction in right ventricular and right atrial (RA) sizes, with reverse remodeling of right ventricle and recovery of left ventricular geometry.

DISCUSSION

Longstanding tricuspid insufficiency induces severe RV dilatation and dysfunction. Most commonly, severe tricuspid insufficiency occurs in response to increased pulmonary vascular resistance or left-sided disease. Consequently, most tricuspid procedures are performed in conjunction with left-sided valvular procedures, and the natural history of recovery of RV function after coincidental TV repair is well described.² Reported mortalities for TV operations range from 13% to 20%.^{3,4} The extremely high mortalities reported for these patients are often attributed to comorbid conditions, such as multivalvular heart disease or endocarditis. Specific factors predicting increased mortality risk include elevated preoperative pulmonary vascular resistance, left ventricular disease, RV dysfunction, and low cardiac output.⁵

Operations for isolated TV disease are uncommon, although isolated TV procedures are more common in younger patients. Predictors of successful RV reverse remodeling and good clinical outcomes are not well described.

Before the operation, our patient demonstrated signs of left ventricular dysfunction, with elevated pulmonary capillary wedge pressure and diminished cardiac index in the presence of severe RV dysfunction. These factors would certainly portend a high perioperative mortality risk. Our patient, however, did remarkably well. A large prosthesis, relatively low pulmonary vascular resistance, and absence of true left-sided heart pathology all likely contributed to this successful outcome. Reverse remodeling to normal RV dimensions, recovery of RV function, and absence of heart failure symptoms surprisingly had all occurred by 6 postoperative months, despite 21 years of absent TV. This

case supports an aggressive surgical approach for these often critically ill patients.

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Overcoming challenges: The use of minimal extracorporeal circulation in Jehovah's Witnesses undergoing cardiac surgery

Anil John, FRCS, Mark Bennett, MD, FRCA, Clinton Lloyd, FRCS (CTh), and Simon Allen, FRCS (CTh), Plymouth, United Kingdom

Cardiac surgery in Jehovah's Witnesses often poses a challenge to the surgeon because these patients refuse transfusion of the primary components of blood (red cells, white cells, plasma, and platelets), although individual believers can decide for themselves to accept processed fractions of the primary components. Most cardiac surgeons around the world use standard cardiopulmonary bypass circuits for coronary artery bypass grafting in these patients. Minimal extracorporeal circulation (MECC) is a fully heparin-coated closed-loop cardiopulmonary bypass system. It excludes the blood-gas interface and has active venous drainage, a centrifugal pump, membrane oxygenator, and a priming volume of 800 mL, reduced further to around 300 mL by the use of retrograde priming of the circuit.

Average preoperative hemoglobin level was 14 ± 2.01 g/dL; postoperative hemoglobin level 10.35 ± 1.32 g/dL and percentage drop of hemoglobin on day 1 was $25\% \pm 9.04\%$. Average bypass time was 53 ± 8.57 minutes.

DISCUSSION

Standard cardiopulmonary bypass circuits are associated with marked hemodilution in addition to initiation of the inflammatory response because of contact between blood and artificial surfaces on the lines and oxygenator and also at the

CLINICAL SUMMARY

Between May 2007 and February 2009, 7 Jehovah Witness patients underwent cardiac surgery using this technique (coronary artery bypass grafting in 6 and aortic valve replacement in 1). There were 6 male patients and 1 female patient with an average age of 63 years. Comorbidities included hypertension, and 1 patient had poor left ventricular function (Table 1).

From the Southwest Cardiothoracic Centre, Cardiothoracic Surgery, Derriford Hospital, Plymouth, United Kingdom.

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Address for reprints: Anil John, FRCS, Southwest Cardiothoracic Centre, Department of Cardiothoracic Surgery, Derriford Hospital, Plymouth PL6 8DH, United Kingdom (E-mail: ajohn234@hotmail.com).

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TABLE 1. Patient characteristics

	Patient no.						
	1	2	3	4	5	6	7
Age (y)	65	71	71	50	64	50	72
Sex	M	M	M	M	M	M	F
Hypertension	No	Yes	Yes	Yes	No	Yes	No
LV function	Good	Good	Poor	Good	Good	Good	Good
Surgery	CABG	CABG	CABG	CABG	CABG	CABG	AVR
No. of grafts	3	3	3	2	3	2	None
Preop Hb (g/dL)	14.8	14	9.7	13.9	15.6	15.6	14.2
Crossclamp (min)	30	34	36	23	27	25	37
Bypass time (min)	51	62	57	36	60	52	52
Postop Hb (g/dL)	12.2	10.4	8.2	11.7	9.6	10.3	10.1
Drop in Hb (%)	18	26	15	16	38	34	28
Day 4 Hb (g/dL)	14.2	11.4	8.7	11.4	11.3	11.2	10
Total blood loss (mL)	540	470	865	380	420	310	440
Extubation time (h)	2.5	4	2.5	2	2	2	3
ITU stay (d)	1	1	2	2	1	1	1
Length of stay in hospital (d)	6	7	14	6	6	6	6

LV, Left ventricular; CABG, coronary artery bypass grafting; AVR, aortic valve replacement; Hb, hemoglobin; ITU, intensive treatment unit.