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Clinical paper

Traumatic pericardial effusion: Impact of diagnostic and surgical approaches☆

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ABSTRACT

Introduction: In trauma patients with chest injuries, traumatic pericardial effusion is an important scenario to consider because of its close linkage to cardiac injury. Even with advances in imaging, diagnosis remains a challenge and use of which surgical approach is controversial. This study reviews the treatment algorithm, surgical outcomes, and predictors of mortality for traumatic pericardial effusion.
Patients and methods: Information on demographics, mechanisms of trauma, injury scores, diagnostic tools, surgical procedures, associated injuries, and hospital events were collected retrospectively from a tertiary trauma center.
Results: Between June 2003 and December 2009, 31 patients (23 males and 8 females) with a median age of 31 (range 16–77), who had undergone surgical drainage of pericardial effusion were enrolled in the study. Blunt trauma accounted for 27 (87.1%) insults, and penetrating injury accounted for 4 (12.9%). Patients were diagnosed by Focused Assessment with Sonography for Trauma (FAST) (8 patients), computerized tomography (7 patients), echocardiography (9 patients), and incidentally during surgery (7 patients). Notably, sixteen (51.7%) patients required surgical repair for traumatic cardiac ruptures, including 6 (19.6%) with pericardial defects who presented initially with hemothorax. The surgical approaches were subxiphoid in 8 patients (25.8%), thoracotomy in 7 (22.6%), and sternotomy in 19 (61.2%), including 3 conversions from thoracotomy. The survival to discharge rate was 77.4% (24/31). Concomitant cardiac repair, associated pericardial defects, and initial surgical approach did not affect survival, but the need for massive transfusion, cardiopulmonary cerebral resuscitation (CPCR), trauma score, and incidental discovery at surgery all had a significant impact on the outcome.
Conclusions: Precise diagnoses of traumatic pericardial effusions are still challenging and easily omitted even with FAST, repeat cardiac echo and CT. The number of patients with traumatic pericardial effusion requiring surgical repair is high. Standardized therapeutic protocol, different surgical approaches have not impact on survival. Correct identification, prompt drainage, and preparedness for concomitant cardiac repair seem to be the key to better outcomes.

1. Introduction

With advances in traumatic care, including pre-hospital management, rapid assessment through Focused Assessment with Sonography for Trauma (FAST), the availability of echocardiography and computed tomography (CT), and the organization of cardiologists and cardiac surgeons by trauma surgeons, the detection of traumatic pericardial effusion has increased. Traumatic pericardial effusion is a rare but potentially life-threatening insult because of its close linkage to cardiac rupture. Cardiac rupture, comprises only 0.16–2% of traumatic admissions, often result in death at the scene, and is associated with high mortality if neglected.[1,2] The present study reviews 6-year experience in the management of traumatic pericardial effusion and examines the factors that influence survival.

2. Patients and methods

2.1. Patients

This retrospective study was conducted with the approval of our Institutional Review Board (IRB). Trauma patients who underwent surgical drainage for pericardial effusion between June 2003 and December 2009 were enrolled. The following information

☆ A Spanish translated version of the abstract of this article appears as Appendix in the final online version at doi:10.1016/j.resuscitation.2010.06.026.

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Table 1
Patients' characteristics, diagnostic methods, surgical findings, and outcomes for traumatic pericardial effusion ($n = 31$).

Age	Sex	Mechanism	Injury to arrival (h)	CPCR in ER	Pre-op ECG	Diagnosed by	GCS	ISS	Cardiac repair procedure	Pericardial defect	Outcome
27	M	MVC	1	No	NA	FAST	15	33	Cardiorrhaphy		Survive
29	M	MVC	2	No	Tachycardia	CT	15	33	Cardiorrhaphy		Survive
39	M	MCC	1.5	No	RBBB	CV echo	15	29	Cardiorrhaphy		Survive
69	M	MVC	4	No	RBBB	CV echo	15	25	Cardiorrhaphy		Survive
42	M	MVC	1	No	NA	Intra-operation	10	25	Cardiorrhaphy		Survive
47	F	Crush	3	No	RBBB	FAST	15	34	Cardiorrhaphy	Positive	Survive
67	F	Ped struck	49	No	Non-specific ST change	CV echo	15	29	Cardiorrhaphy		Survive
73	F	Ped struck	4	No	Normal	FAST	7	41	Cardiorrhaphy		Die
24	M	MVC	3	Yes	Sinus tachycardia	FAST	3	31	Cardiorrhaphy and ECLS		Die
38	M	MVC	0.5	Yes	Bradycardia	Intra-operation	3	31	Cardiorrhaphy	Positive	Die
39	M	MCC	1.5	Yes	Non-specific ST Change	TEE	6	43	Cardiorrhaphy		Die
48	M	MVC	4	Yes	Non-specific ST Change	Intra-operation	13	43	Cardiorrhaphy and ECLS	Positive	Morbid neurologic sequela
24	M	MCC	5	No	Sinus tachycardia	CT	14	33	Cardiorrhaphy		Survive
46	M	Stabbing	2	Yes	NA	Intra-operation	11	16	Cardiorrhaphy	Positive	Survive
31	M	Explosion	4	No	Normal	Intra-operation	15	9	Cardiorrhaphy	Positive	Survive
26	M	Stabbing	1	Yes	Non-specific ST Change	Intra-operation	6	41	Cardiorrhaphy	Positive	Morbid Neurologic sequela
77	M	MCC	4	No	Non-specific ST Change	CV echo	11	19	NA		Survive
20	M	MCC	4	No	NA	CT	15	13	NA		Survive
25	M	MVC	0.5	No	NA	FAST	14	9	NA		Survive
25	M	MVC	3	No	Electric alternans	CV echo	13	29	NA		Survive
30	F	MVC	0.5	No	NA	FAST	14	13	NA		Survive
40	F	MVC	2	No	General low voltage	CV echo	15	17	NA		Survive
45	M	MCC	4	No	NA	CV echo	4	29	NA		Survive
22	M	MCC	0.5	Yes	NA	FAST	3	59	NA		Die
16	M	MVC	1	No	NA	TEE	9	34	NA		Die
27	M	MVC	3	No	Normal	CT	15	13	NA		Survive
21	M	MVC	1.5	No	Normal	CT	15	14	NA		Survive
19	F	MCC	3	Yes	NA	FAST	12	41	NA		Die
64	M	Explosion	4	No	Sinus tachycardia	CT	15	25	NA		Survive
28	F	MVC	6	Yes	NA	CT	11	17	NA		Survive
56	F	MVC	3	No	Non-specific ST change	Intra-operation	14	24	NA		Survive

CPCR, cardiopulmonary cerebral resuscitation; CT, computed tomography; CV echo, cardiac echo by cardiologists; ECLS, extracorporeal life support; ER, emergency room; F, female; FAST, focused assessment with sonography for trauma; GCS, Glasgow coma scale; M, male; MCC, motor cycle crash; MVC, motor vehicle collision; NA, not available; Ped, pedestrian; RBBB, right bundle branch block; TEE, transesophageal echocardiograph.