



ABSTRACT

A 19-year-old male military recruit presented for a screening physical for US Naval Special Warfare and Diving Duty during which an exophytic pericardial cyst was discovered.

Work-up revealed normal cardiopulmonary function despite the 7 cm mass, however, the candidate was disqualified due to concerns regarding the risk of complications.

He underwent elective surgical resection without post-operative complications. One year post-operatively, he underwent cardiopulmonary work-up with normal results, and successfully completed training.

Review of the literature reveals that complications from pericardial cysts are rare and range widely in severity, however, the severe and repetitive trauma experienced by Special Operators raises clinical concern for these lesions.

Because of the increased risk of morbidity and mortality in the Special Operations environment, clearance for duty should not be granted those individuals.

Clearance for diving duty may be granted following successful elective surgical resection and post-operative follow-up in clinically asymptomatic individuals.

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Congenital Pericardial Cyst in a Naval Special Warfare Candidate: Clearance for diving after resection

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INTRODUCTION

Congenital pericardial cysts are rare, with an estimated incidence of 1/100,000, and representing 7% of thoracic neoplasms¹⁻⁴ and predominantly benign findings that pose little risk to the individual and cause little morbidity or mortality.¹⁻⁷

Complications are rare, and range from mild persistent cough to rare but catastrophic rupture of the cyst with resultant shock due to hemorrhage, fluid shift, right-ventricular collapse due to pressure release, pericardial tamponade, or pulmonary collapse.⁸⁻¹⁹

In the general population, the commonly accepted therapeutic approach is observation in the case of asymptomatic cysts, and thoroscopic resection for symptomatic lesions only.¹

Currently accepted standards for screening of divers, both working (commercial and military) and recreational, discourage clearance for diving in cases of structural or arrhythmic heart disease.²⁰⁻²¹

Limitations to firm recommendations are due to the relative rarity of the condition, minimal data on the rate of complications and their severity in asymptomatic cysts, the rarity of comprehensive pre-participation diving examinations for recreational divers, and the large degree of selection bias toward healthy individuals present in the Special Operations community.

CASE

An asymptomatic 19-year-old male presented to the Undersea Medicine Department for his routine screening physical examination for Naval Special Warfare .

His screening ECG showed normal sinus rhythm . Screening chest radiograph (Figure 1) showed blunting of the right cardiophrenic angle. Chest CT (Figure 2) confirmed the finding of a large benign congenital pericardial cyst, measuring 6.7 x 3.5 x 3.4 cm. ECHO showed normal LV function with EF >55%.

The subject underwent elective thoroscopic resection without complications. Post-operative work-up was unremarkable with normal ECG, spirometry, ECHO and V/Q scan. Expected post-surgical changes were seen on CXR and CT Chest.

Deemed low-risk, he was cleared for Naval Special Warfare and Diving duties, and allowed to proceed in training, successfully graduating from Naval Special Warfare Center Coronado, CA, including successfully completing "Hell Week" as well as over 30 dives without incident.



Figure 1. Pre-Operative CXR

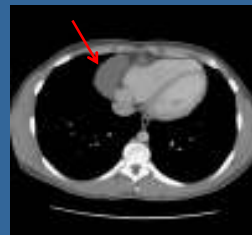


Figure 2. Pre-Operative CT Chest

DISCUSSION

Changes in wall tension from precipitous growth of pericardial cysts has led to concerns of the risk of rupture with the potential for catastrophic hemodynamic collapse and arrhythmia in divers.

For recreational SCUBA divers, who routinely experience ambient pressures on the order of 4-5 ATA yet have a primarily non-stressed experience, there ought to be little risk for significant complications as the transudate is incompressible.^{4,20} A more likely complication would be cystic adhesion to adjacent pleural or pericardial membranes.

Given the increased thoracic trauma to be expected in the Special Operator population (parachuting, combat-induced trauma, high-speed decelerations), this setting presents a far greater risk to cyst rupture, and an independent risk factor in its own right. Moreover, in a hostile environment wherein each member plays a key role, an injured member presents a liability in terms of mobility and operability that is unacceptable for Special Warfare.

The key questions for the clinician remain thus: a) is this condition of concern in a given setting? and b) is the risk-benefit ratio of the therapy in favor of intervention in a given setting?

Given the austerity of the environment, and the risk to subject, team and mission in those settings the increased risk of catastrophic complications must be weighed on an individual basis.^{4,11}

It is our opinion that such risk outweighs the risk of resection in a controlled environment wherein physiology suggests higher risk of catastrophic complications.

Source	# of Cases	Reported Complications	Recommendation for Intervention
Ferguson, 2006	17	Tamponade Hemorrhage Shock Death	Excise
Maisch, 2004	N/A	N/A	Percutaneous aspiration and ethanol sclerosis or VATS
Patel, 2004	2	Unknown	ECHO useful for imaging
Server, 2004	1	None	None
Mouroux, 2003	13	None	Excise
Takeda, 2003	12	None	Excise
Ambavalavanan, 1997	1	None	None
Abad, 1996	2	None	Excise
DeRoover, 1963	3	Pachypleuritis	Excise

Table 1. Summary of Reported Cases^{1-5, 9, 22-24}

CONCLUSIONS

Comparison of reported cases and pathophysiology with the low risk of complications of minimally-invasive surgical resection suggests that elective resection is reasonable in those who are occupationally subject to severe or repeated trauma.

In recreational divers, the recommendation to withhold clearance from diving can be questioned, however, we support the continued recommendation against clearance for military Special Operations training.²⁰⁻²¹

In cases where elective resection is pursued, thorough post-operative evaluation is recommended, and clearance for diving and for Special Operations may be granted in asymptomatic individuals with good outcomes.

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