**Supplementary Digital Content Table: List of Articles Reviewed**

|  |  |  |  |
| --- | --- | --- | --- |
| **Recreation diving or swimming (nonmilitary)** |  |  |  |
| **Study** | **Number of cases (sex)** | **Age (years)** | **Context** | **Medical history** | **Cardiopulmonary evaluation findings** |
| Beinart 2007 (5) | 1 (M) | 54 | Scuba | HTN | EKG: ischemic changes in I, aVLechocardiogram: global LV and RV dysfunctioncoronary angiography: normalpossible Takotsubo cardiomyopathy |
| Biswas 2004 (6) | 1 (M) | 36 | Triathlon | Diabetes mellitus, Type I | CXR: normalEKG: sinus bradycardiacardiac biomarkers: elevatedechocardiogram: mild LVH, trace MR, trace TRstress test: negative |
| Boggio-Alarco 2006 (7) | 1 (M) | 36 | Triathlon  | None reported | EKG: normalEchocardiogram: hypokinesiscardiac biomarkers: troponin elevated |
| Carter 2011 (9) | 3 (F) | 48.7 ± 8.1 | Triathlon, cold fresh water | asthma (n=1), recurrent episodes of dyspnea/hemoptysis during triathlon (n=2) | CXR: abnormal opacities (n=3)evaluation otherwise normal/inconclusive |
| Chenaitia 2010 (11) | 1 (F) | 51 | Scuba | normal | CXR: pulmonary edemaEKG: ischemic changes in I, aVL, V1, V2cardiac biomarkers: elevatedechocardiogram: LV mid-apical hypokinesis, ejection fraction 35%coronary angiography: normalCT chest: pericardial effusion, bilateral abnormal opacitiesBNP: elevatedIdentified as Takotsubo cardiomyopathy |
| Cochard 2005 (14) | 5 (4 M, 1 F) | 49.2 ± 7.6 (mean ± SD) | Cold water scuba | HTN (n=3); isolated HL (n=1); prior episode of IPE (n=1); arthritis (n=1) | CXR: pulmonary edema (n=4)EKG: ischemia (n=1), normal (n=4)cardiac biomarkers: elevated troponin I (n=1)echocardiogram: LV akinesis, ejection fraction 31% (n=1); normal (n=4)coronary angiography: normal (n=1)PFT: normal (n=2)Death in 1 patient |
| Cochard 2013 (15) | 1 (M) | 46 | Surface swimming | Ankylosing spondylitis with NSAID use, HTN, tuberculosis contagium | CT chest: pulmonary edemaEKG and echocardiogram normal  |
| Cordier 2011 (16) | 1 (M) | 52 | Scuba | cardiac arrest upon surfacing from 59 fsw, resuscitated after 1 hour CPR | CXR: pulmonary edemaEKG: RBBBcardiac biomarkers: elevated troponinechocardiogram: normalBNP: normalDeath after 24 h due to multiorgan failure |
| Cosgrove 1996 (17) | 1 (F) | 58 | Cold water scuba | isolated hyperlipidemia (untreated) | EKG and cardiac biomarkers normal |
| Coulange 2010 (18) | 22 (8 M, 14 F) | 47.5 ± 9.1 (mean ± SD) |  | normal | cardiac biomarker:s elevated (n=4), normal (n=15)BNP: elevated (n=9), normal (n=7) |
| Deady 2006 (19) | 1 (F)  | 38 | Cold water triathlon | normal | CXR: pulmonary edemaD-dimer: moderately elevatedEKG: normalcardiac biomarkers: negative |
| Dessardo 2011 (20) | 1 (F) | 12 | Surface swimming (pool) | NormalCause identified as Takotsubo cardiomyopathy | CXR: pulmonary edemaEKG: ischemic changescardiac biomarkers: elevatedechocardiogram: left ventricular apical, septal, mid-ventricular hypokinesis, ejection fraction 30%coronary angiography: normal |
| Dwyer 2007 (21) | 1 (M) | 54 | Scuba | chronic atrial fibrillation, gout, recurrent IPE episodes | EKG: atrial fibrillation (unchanged from baseline)CXR, cardiac biomarkers, echocardiogram, PFT, treadmill stress test normal |
| Edmonds 2009 (22) | 1 (M) | 72 | Warm water scuba | normal | None |
| Edmonds 2012 (23) | 3 (F) | 49 ± 3.5(mean ±) | Scuba | Allergic diathesis (n=1), ADHD and migraine (n=1), previous episode of immersion pulmonary edema  | Death prior to hospital admission (n=3) |
| Gempp 2013 (27) | 54 (36 M, 18 F) | 46 ± 13(mean ± SD) | Scuba | Previous IPE (n=9), OSA (n=2), coronary disease (n=1), HTN (n=15), DM (n=3), hyperlipidemia (n=12) | EKG: ST-segment depression (n=9), left bundle branch block (n=1), T-wave inversion (n=1)Cardiac biomarkers: elevated (n=15)Echocardiogram: hypertrophy (n=3), hypokinesia (n=13), mitral regurgitation (n=1)Coronary angiography: mild irregularities (n=1) |
| Glanvill 2006 (28) | 1 (F) | 48 | Cold water scuba | past history of rheumatic fever, recurrent IPE episodes | none |
| Gnadinger 2001 (29) | 1 (M) | 52 | Warm water, swimming pool scuba | bicuspid aortic valve | EKG: LVH by criteriaechocardiogram: trace aortic insufficiency, bicuspid aortic valve |
| Grindlay 1999 (30) | 1 (F) | 31 | Swimming pool scuba | exercise-induced cough with normal pulmonary function tests | EKG, echocardiogram, pulmonary function tests, stress test normal |
| Halpern 2003 (31) | 1 (M) | 50 | Scuba | obsessive-compulsive disorder | EKG: normal |
| Hampson 1997 (32) | 6 (2 M, 4 F) | 43.3 ± 12.9 (mean ± SD) | Scuba | 2 with pre-existing comorbidities:HTN/past cerebrovascular accident (n=1); recurrent IPE episodes (n=1) | CXR, PFT, echocardiogram normal |
| Hempe 2003 (33) | 1 (F) | 49 | Scuba | normal | CXR: acute pulmonary edemaEKG: normal |
| Henckes 2008 (34) | 13 (10 M, 3 F) | 48.5 ± 10.6 (mean ± SD) | Scuba, surface swimming (n=1) | 10 with pre-existing comorbidities:HTN (n=2), GERD, HTN/hypothyroidism, TR/MR/PVCs, HTN/murmur/chordae rupture, HTN/OSA, depression/mitral regurgitation, depression/spine surgery, HTN/HL/TB  | CXR: pulmonary edema (n=6), cardiomegaly (n=2), normal (n=2)EKG: tachycardia (n=1), LBBB (n=1), normal (n=1)cardiac biomarkers: negative (n=3)echocardiogram: mitral regurgitation (n=1), diffuse hypokinesia (n=1), normal (n=1)CT chest: abnormal opacities (n=8)coronary angiography: normal (n=2)BNP: abnormal (n=2), normal (n=1)D-dimer: normal (n=1)stress test: normal (n=1)Death in 1 patient |
| Kenealy 2008 (35) | 1 (F) | 69 | Scuba diving in heated pool | chronic mild exertional dyspnea, hypothyroidism, daily alcohol use, recurrent episode of dyspnea during swimming | CXR: pulmonary edemaEKG: LBBBcardiac biomarkers: negativeechocardiogram: global hypokinesis, LVEF 45%, diastolic dysfunctionPFT: normalcoronary angiography: mild coronary artery disease |
| North 2013 (48) | 1 (F) | 26 | Surface swimming | None | CXR: bilateral airspace shadowing |
| Pons 1995 (52) | 5 (4 M, 1 F) | 27.8 ± 6.5 (mean ± SD) | Scuba, surface swimming | recurrent IPE episodes (n=1) | CXR: pulmonary edema (n=4)echocardiogram: normal (n=2) |
| Roeggla 1996 (53) | 1 (F) | 54 | Scuba | normal | CXR: pulmonary edema coronary angiography: normalstress test: negative |
| Slade 2001 (57) | 8 (3 M, 5 F) | 52.4 ± 5.6 (mean ± SD) | Scuba | 6 with pre-existing comorbidities:isolated HTN (n=2), isolated asthma (n=1), HTN/asthma (n=1), resolved childhood asthma (n=1), chronic atrial fibrillation (n=1) | CXR: pulmonary edema (n=7)EKG: atrial fibrillation (n=1), LBBB (n=1), normal (n=1)cardiac biomarkers: normal (n=3)exercise stress test: negative (n=3)stress echocardiogram: negative (n=1)nuclear stress test: negative (n=1)V/Q scan: negative (n=1) |
| Spiteri 2011 (59) | 1 (M) | 37 | Triathlon  | previous episode of dyspnea during triathlon swimming, no other medical history reported | CXR, EKG, coronary angiography normal |
| Stefanko 2009 (60) | 1 (M) | 36 | Triathlon | Recent acute upper respiratory infection, recent NSAID use, oral fluid loading | CXR: diffuse infiltratesEKG: normalechocardiogram: mild inferior hypokinesis, trivial mitral regurgitation, estimated pulmonary pressure 28 mmHgcardiac biomarkers: elevatedother laboratory studies: hyponatremia (serum sodium 120 mmol/L) |
| Van Renterghem 2011 (61) | 1 (M) | 56 | Scuba | previous episode cough/dyspnea during diving, HTN, sleep apnea, hyperlipidemia | (1 month after incident)CXR, EKG, echocardiogram, V/Q scan normal |
| Wenger 2007 (63) | 1 (M) | 43 | Aqua-jogging in lake | normal | CXR: pulmonary edemaEKG, cardiac biomarkers, echocardiogram normal |
| Wilmshurst 1989 (67) | 11 (8 M, 3 F) | 45.6 ± 2.6 (mean ± SE) | Cold water scuba | hypertension (n=1)(on follow-up at 1-16 years, development of hypertension in 6 more patients, Raynaud's phenomenon in 1 patient, atrial fibrillation in 1 patient) | normal |
| Wilmshurst 2004 (66) | 3 (2 M, 1 F) | 45.7 ± 13.6 (mean ± SD) | Swimming (n=1), scuba (n=2) |  previous/subsequent episodes precipitated by arguments (n=1), subsequent episode during cross-country skiing (n=1) | CXR: pulmonary edema (n=3)EKG: ischemic changes in I and V6 (n=1), normal (n=2)cardiac biomarkers: normal (n=2)echocardiogram: normal (n=3)coronary angiography: normal (n=2)exercise stress test: negative (n=1) |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Military** |  |  |  |  |  |
| **Study** | **Number of cases (sex)** | **Age (years)** | **Context** | **Medical history** | **Cardiac evaluation findings** |
| Adir 2004 (1) | 70 (M) | 18-19 | Israeli navy surface swimming | normal (n=70), recurrent episodes (n=16) | CXR: normal at 12-18 hours (n=70)echocardiogram: normal (n=20)PFT: decreased FVC and FEV1 compared to baseline (n=37) |
| Gempp 2011 (26) | 11 (M) | 29 ± 5 (mean ± SD) | mine clearance divers | medical history not reported | none reported |
| Knutson 2010 (36) | 1 (F) | 43 | Swedish military, surface swimming | normal | CXR, EKG, echocardiogram, stress test normal |
| Ludwig 2006 (40) | 11 (M) | 27 (range 20-35) | U.S. navy surface swimming | normal | CXR: pulmonary edema (n=3) |
| Lund 2003 (41) | 3 (M) | 24.3 ± 3.1 (mean ± SD) | U.S. navy surface swimming, right lateral decubitus | normal | CXR: abnormal opacities (n=2), normal (n=1) |
| Mahon 2002 (43) | 3 (M) | 22-28 | U.S. navy, lateral decubitus  | normal | CXR: unilateral pulmonary edema |
| Shearer 2009 (54) | 6 (M) | 27.2 ± 2.9 (mean ± SD) | U.S. navy surface swimming | normal | CXR: abnormal opacities (n=6)BNP: normal (n=6) |
| Shupak 2000 (56) | 21 (M) | 18-19 | Israeli navy, surface swimming | Normal, recurrent episodes (n=6) | none reported |
| Shupak 2003 (55) | 1 (F) | 20 | Israeli navy, closed circuit scuba | normal | CXR: normalEKG: normalechocardiogram: patent foramen ovale with right-to-left shunt on ValsalvaCT chest: pulmonary edema, negative for pulmonary embolusPFT: decrease volumes and flows compared to 3 months prior |
| Weiler-Ravell 1995 (62) | 8 (M) | 18.3 ± 0.5 (mean ± 0.5) | Israeli navy, surface swimming, 5-liter oral volume loading | normal (n=7), recurrent episodes (n=2) | CXR: abnormal (n=1), normal (n=7) |
| Yoder 2004 (69) | 1 (M) | 20 | U.S. navy diving | normal | CXR: abnormal perihilar infiltrates EKG, cardiac biomarkers normal |

**Abbreviation list**

BNP: B-type natriuretic peptide

CT: computed tomography

CXR: chest radiograph

DM: diabetes mellitus

FEV1: forced expiratory volume in 1 second

FVC: forced vital capacity

GERD: gastroesophageal reflux disease

LBBB: left bundle branch block

HL: hyperlipidemia

HTN: hypertension

LVEF: left ventricular ejection fraction

LVH: left ventricular hypertrophy

LV: left ventricle

MR: mitral valve regurgitation

OSA: obstructive sleep apnea

PFT: pulmonary function test

RBBB: right bundle branch block

RV: right ventricle

TR: tricuspid valve regurgitation

V/Q: ventilation-perfusion