

# PORTAL VENOUS GAS ASSOCIATED WITH DECOMPRESSION SICKNESS IN SPORT DIVERS: A CASE SERIES

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# Background

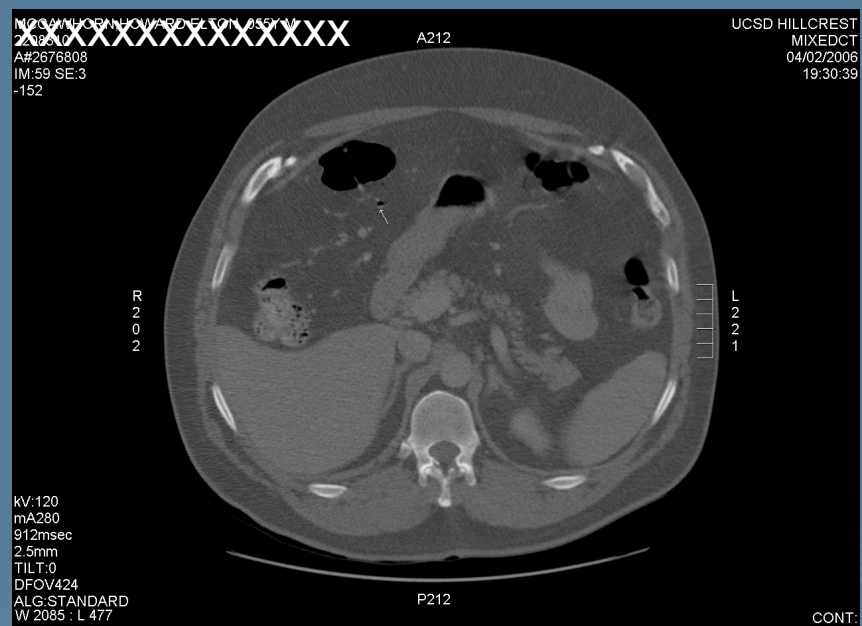
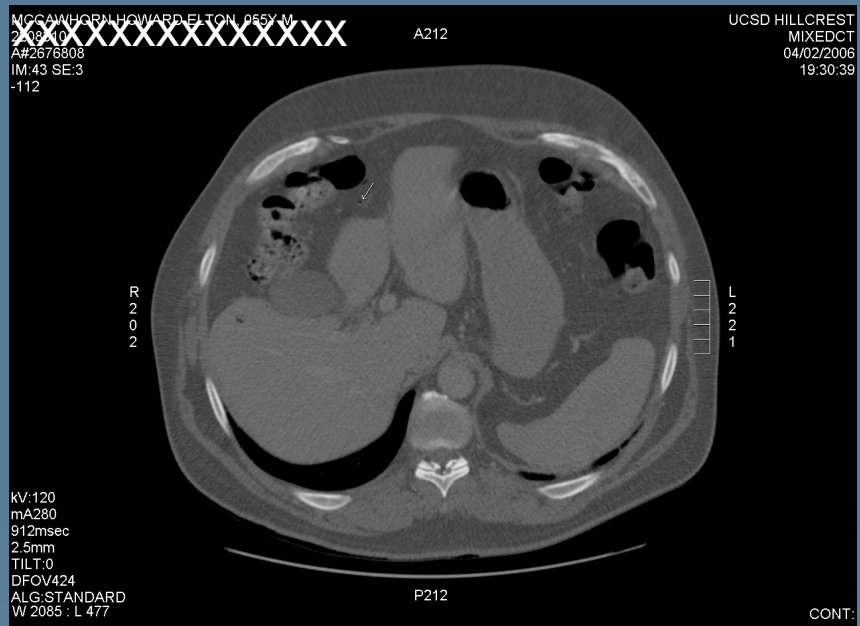
- Atmospheric decompression creates a thermodynamic disequilibrium in body tissues which affects the inert gases dissolved in these tissues.
- Venous gas embolism (VGE), describes the presence of intravascular gas bubbles. This phenomenon is associated with but not pathognomonic for DCS.

- Numerous studies have described the pathological manifestations and mechanisms of DCS.
- Despite the fact that gas bubbles in the portal venous system and elevations of liver enzymes have both been reported after diving, prior investigators have concluded that VGE affecting the liver is not an important clinical entity.

- Recently at the University of California San Diego Medical Center, divers have presented on three occasions with abdominal pain following routine SCUBA dives.
- Computed Tomography (CT) imaging in all 3 cases demonstrated hepatic portal venous gas (HPVG)

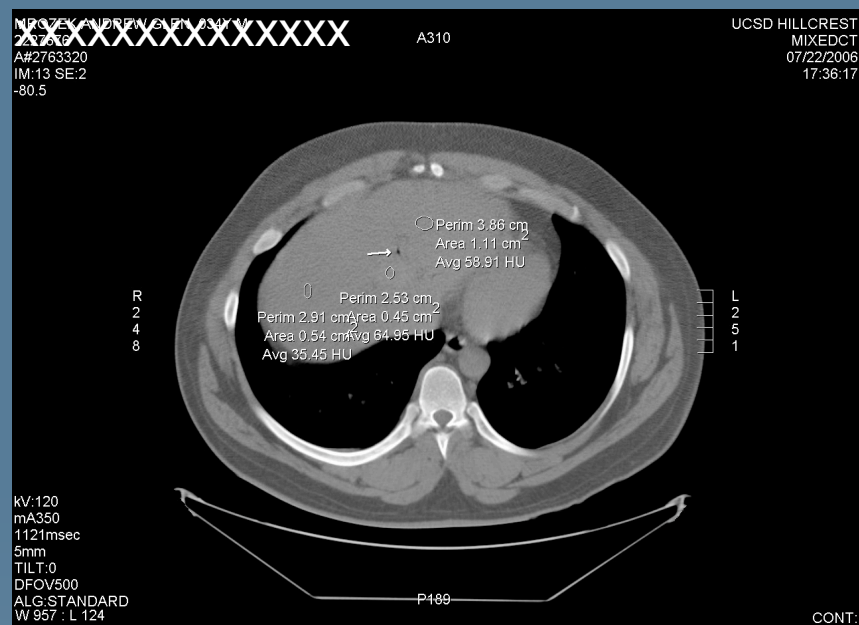
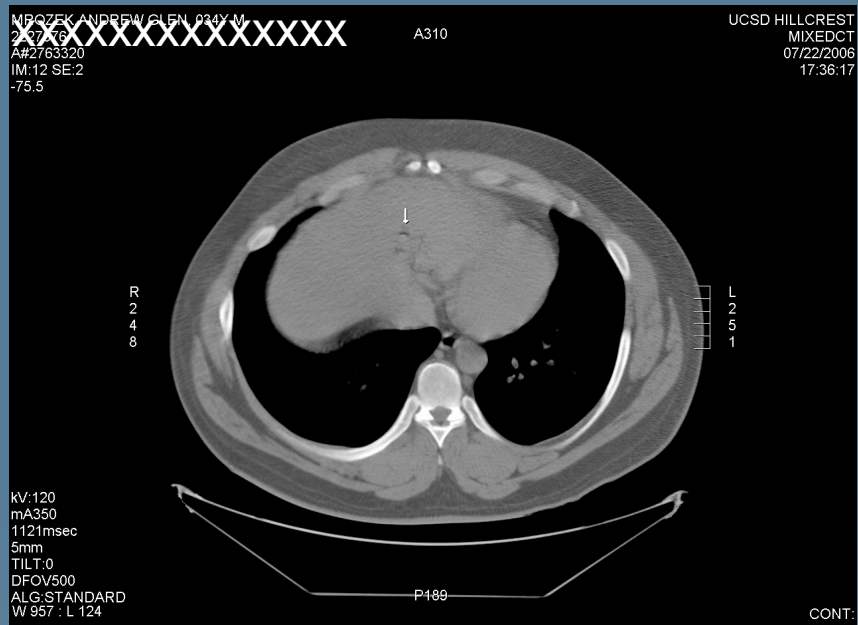
# Case 1

- **HPI:** a 55y/o M certified rescue diver c/o abd pain. Pt dove to 115fsw max depth for TBT of 30 min, 2.5 hr SI, second dive 85 fsw for 44 min. 45 min after surfacing the patient began to feel “crampy” epigastric abd pain, gradual onset of “blurry” vision, and a non-pruritic “bluish painful rash” in the epigastric area. In the ED pt noted the rash was nearly gone and his vision had returned to nl
- **ROS:** otherwise neg
- **PEX:** afebrile, vs wnl
- mild epigastric ttp w/o r/g. Remainder of the exam was unremarkable.  
**LABS:** lytes and AST/ALT wnl, CBC with elev WBC of 16.7 with 86% segs and 3% bands, CK elev 533.
- **CT ABD:** gas in the inferior vena cava (IVC) as well as gas in the portal venous system.
- **TX:** USN TT6 for presumed DCS
- **F/U:** after 0-15minutes at 2.8ATA patient stated that "all symptoms were gone"



# Case 2

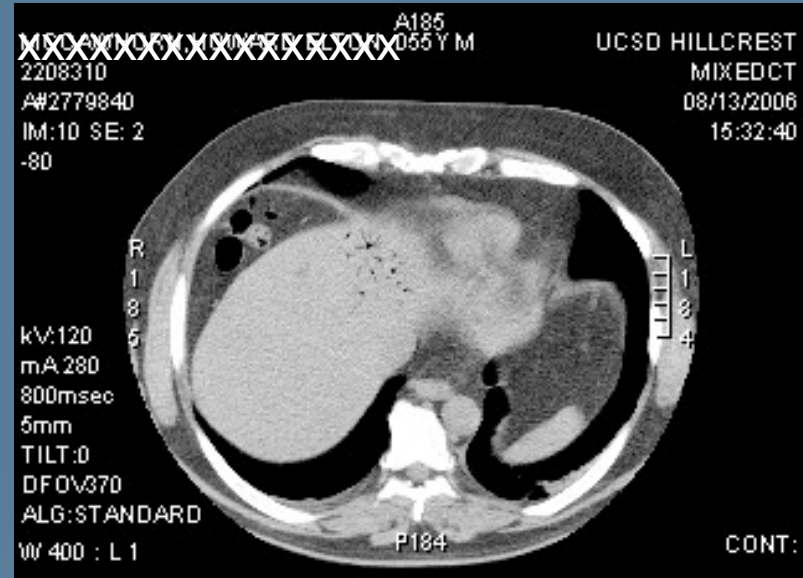
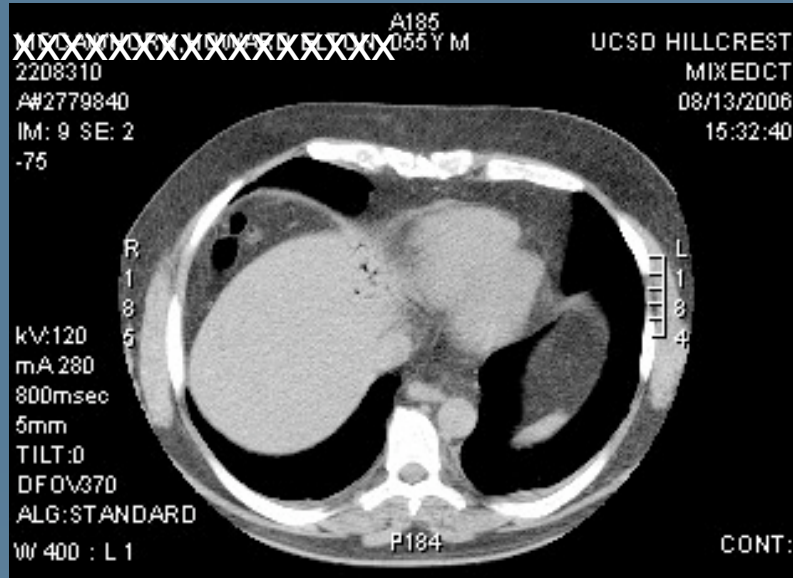
- **HPI:** a 34y/o M diver BIBM after a syncopal episode with c/o L arm numbness and abd, thigh, and buttock pain. Pt dove on Trimix 25% to 105 fsw for 65 min, SI 2 hours, and a second dive to 105 fsw for 56 min with a 12 min decompression stop. 30 min after surfacing the pt experienced “firey” abd pain radiating into his buttocks and bilateral thighs anteriorly. 30 min after onset of abd pain, the pt experienced a syncopal episode. Enroute to the hospital the pt experienced a second syncopal episode, called 911, and was transported to ED.
- **ROS:** otherwise negative
- **PEX:** T 102.2 HR 102; BP and RR wnl. O2 100% on RA
- diffuse abd ttp w/o r/g. Remainder of the exam was unremarkable.
- **LABS:** lytes wnl, AST/ALT 53/59, CBC elev WBC 16.8 with 85% segs and 0% bands, CK 512
- **CT ABD:** air in liver “probably in portal or hepatic veins” per Radiologist
- **TX:** USNTT6
- **F/U:** second O2 period at 60 fsw, the pt endorsed complete resolution of his abd pain. repeat T 97 F and HR 75





# Case 3

- **HPI:** Pt from Case One c/o abd pain after diving. The pt dove twice; first dive to 80fsw for 50 min (20 min at depth), a 90 minute SI, and a second dive to 60fsw for 62 min (40 min at depth). 75 min later the pt experienced abd pain, nausea, transient blurred vision (lasting moments), l elbow pain, and l lat leg numbness. His dive buddy came to the house and started him on surface O2 15L/min by NRB. On arrival to ED his only presenting complaint was generalized abd discomfort. This presentation followed the first deeper dives the patient had done since prior HBOT, and he had completed 40 shallow dives since April without incident.
- **ROS:** otherwise negative
- **PEX:** afebrile, with vital signs within normal limits.
- diffuse abd ttp w/o r/g. Remainder of the exam was unremarkable.
- **LABS:** CBC wnl, WBC 11 with 86% segs and 0% bands. CK elev 274
- **CT ABD:** small foci of gas within the IVC, intrahepatic portal veins, and mesenteric vessels of the transverse colon.
- **TX:** USN TT6.
- **F/U:** Upon reaching tx depth on 100% O2, the pt stated that his abd pain had completely resolved.



# Key Points

- Portal venous gas has been visualized by multiple modalities following decompression.
- Case reports exist documenting elevations of transaminases in individuals with abdominal pain following decompression.
- Few studies exist which further investigate this phenomenon of portal VGE after SCUBA diving.
- Our case series suggests that there may be a relationship between hepatic portal venous gas and atypical abdominal manifestations of DCS after SCUBA diving.

# Conclusion

- Further study, including CT evaluation of the hepato-portal circulation in SCUBA divers (with and without evidence of DCS) could provide much needed additional data in this investigation.