Emergency Orbital Decompression
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ABSTRACT
Blindness from orbital hemorrhage following surgery, direct trauma, and remote trauma is not common. Compression cyanosis is a rare condition which may cause blindness. Non-ocular injuries may direct attention elsewhere and emergency surgical procedures may be necessary to save life. Orbital decompression can be carried out simultaneously with the other surgery. One case of blindness from abdominal compression and another with orbital, chest, and arm trauma are presented of patients who had emergency orbital decompression along with their other surgical procedures.

COMPRESSION CYANOSIS
Compression cyanosis or traumatic anoxia is a condition resulting from compression injuries of the chest or abdominal cavity. In this condition there is marked cyanosis and marked petechiae formation in the upper body and the head. Proptosis, according to Duke Elder, may be so severe as to result in the rapid loss of vision. Wust, in 1947, reported a man who had his chest compressed between two steel girders. Blindness followed within the hour. Other signs and symptoms were almost identical to the case presented below. Orbital decompression was carried out with the return of vision. The following case report, to my knowledge, is the first such in the English literature.

CASE REPORTS
CASE 1: The patient was a 21-year-old seaman who fell off of a ship. He was caught between two barges. He was admitted to the hospital emergency room approximately one-half hour after the 4:00 PM accident. There were petechial hemorrhages on his face, chest, and neck. The abdomen was excessively tender and rigid. No bowel sounds were heard. The patient was conscious and stated, among other things, that he could not see anything. His eyes showed exophthalmos, subconjunctival edema and a fixed position (Figure 1). The corneas were clear. The pupils were dilated and fixed. There was no papilledema present. The retinal veins were full and the arteries were vigorously pulsating. The patient had urologic, neurologic, and orthopedic and ophthalmologic consultations. He immediately received Ringer’s Lactate solution and colloidal solutions to help sustain his blood pressure. The systolic blood pressure was 80. At approximately 5:05 PM the patient was taken to the operating room. The systolic blood pressure had dropped to 60. The patient was prepared for a splenectomy. On opening the abdomen the kidney was found to be in the peritoneal cavity. It was a normal color and repositioned in place. The

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spleen was ruptured and removed. Because of the exophthalmos, the blindness, the dilated pupils and the retinal arterial pulsations, there was fear that total circulation to the retina would be cut off. Bilateral orbital decompressions were considered urgent. These were done at the same time as the splenectomy. The left orbit was entered first. The incision was made in the lower lid. As soon as the orbit was entered, a marked amount of dark blood came forth. The orbital floor was deliberately fractured in one location in order to allow more space. As soon as the orbit was decompressed, the pupil which had been dilated and fixed became small. Observation of the fundus revealed that the retinal arteries were no longer pulsating on this side. The right pupil was still dilated and fixed, the arteries at the disc were still pulsating. A similar procedure was carried out on the right side, but the orbital floor was not fractured. Immediately following drainage of blood from the right orbit, the right pupil became small and the arteries ceased their pulsations. The following day the pupils were reacting. The patient complained of slight double vision. No obvious muscle imbalance was found. On the second postoperative day, a few streak hemorrhages next to the disc and in the posterior pole were seen. Since the patient had difficulty in breathing, a tracheostomy had been done and it was impossible to do other diagnostic studies which might be of interest. One week after surgery the double vision was gone. Within three weeks of the injury, the fundus appeared normal. The patient had no muscle imbalance and his visual acuity three weeks after surgery was 20/20 in each eye.

CASE 2—Direct Orbital Trauma: The second patient reported was a 16-year-old girl who was in an automobile accident. She was originally seen at 4:30 AM. The accident had occurred approximately one hour prior to that. General injuries included the handle of the gearshift penetrating the breast just anterior to the chest wall. There were fractures of the right upper arm, difficulty in breathing, shock, and probable closed head trauma. The injuries around the orbit showed a small laceration of the brow. There was some ecchymosis of the lid, subconjunctival hemorrhage, and a cloudy cornea. The right pupil was dilated and fixed. The patient claimed she could not see any light out of this eye. Skull X-rays and a CT scan of the skull and abdomen were reported as negative. Restlessness during the procedure made the interpretation of the results somewhat more difficult. The patient was taken to the operating room for the removal of the foreign body in the anterior chest wall and exploration of the abdomen since there was some concern for a possible ruptured viscus. I first saw her in the operating room with the above-mentioned eye findings and some exophthalmos. The intracocular pressure was 50. While the abdomen was being explored and free blood evacuated from the chest wall, and the gearshift handle removed, an orbital decompression was done. After the orbit was entered, a considerable amount of blood was evacuated. The intracocular pressure dropped to 37. A drain was placed in the incision. As the orbit was entered, it was obvious that there were considerable fractures of the orbital

FIGURE 1: Cyanosis, some petechial hemorrhages, edema, proptosis, subconjunctival hemorrhage, dilated and fixed pupils, all of which are typical of compression cyanosis are seen in this patient.

FIGURE 2: X-rays taken of the orbits after the patient was out of shock. Arrows show fractures of right superior rim, floor of orbit and maxilla.
floor. The patient was placed in the intensive care unit because of her head injury and mental confusion. She was there for approximately five days. By the end of this time, the pupil was reacting and the intraocular pressure was 20. The cornea was slightly hazy due to loss of epithelium. X-rays were taken of the orbit and extensive fractures were found on the upper orbital rim, the lateral wall, and the floor (Figure 2). Repair was accomplished both from the orbital side and the maxillary antrum. A Teflon plate and an antral balloon were used. Over the period of the following three months, the patient's vision gradually improved to 20/20. An insignificant muscle imbalance (1 prism diopter of right hyperphoria) remains. The patient has no external evidence of orbital injury.

DISCUSSION
Evaluation of the circumstances which took place in the first patient would indicate that the patient was in danger of having complete collapse of his retinal circulation. His subjective blindness was ominous. The dilated and fixed pupils with arterial pulsations meant that the external pressure on the retinal arteries was somewhere between the systolic and the diastolic arterial pressure. A further drop in the systolic pressure (and it went to 60) or a further increase in intraorbital pressure might have meant a loss of circulation to the retina and total loss of vision. Prompt surgical intervention with orbital decompression and drainage of blood prevented such a possibility as the arterial pulsation stopped and the pupil became normal size immediately after the blood was drained.

In the second patient the blood in the orbit probably caused the high pressure despite the orbital floor fractures. Evacuation of the blood in the orbit resulted in a reversal of the adverse findings.

While it is possible that reversal of shock and normalization of the patient's general conditions may have restored vision, the instantaneous improvement in the ocular status saved any uncertainty. Megadoses of steroids as an adjunct to decompression and as initial therapy in obviously less urgent cases should be considered.11 Diagnostic studies such as ultrasound and CT scans may not be warranted, or difficult to interpret, because of a patient's inability to cooperate during the examination or general poor physical condition. A prompt diagnosis from the symptoms and physical findings is important and a bold approach may be necessary to give the patient the best possible chance for return of vision.

REFERENCES
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