

MEDICAL INTELLIGENCE

CURRENT CONCEPTS

Jane F. Desforbes, M.D., Editor

Early Management of Shock and Prophylaxis of Acute Renal Failure in
Traumatic Rhabdomyolysis

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Article

References

Citing Articles (110)

Letters

REFERENCES

1. 1

Duarte RG. Seismic risks in nephrology . Dialysis Transplant 1988; 17:530–2,546.

[Web of Science](#)

2. 2

Bywaters EGL, Beall D. Crush injuries with impairment of renal function . Br Med J 1941; 1:427–32.

[CrossRef](#) | [Medline](#)

3. 3

Bywaters EGL, Popjak G. Experimental crushing injury: peripheral circulatory collapse and other effects of muscle necrosis in the rabbit . Surg Gynecol Obstet 1942; 75:612–27.

4. 4

Bywaters EGL, Stead JK. The production of renal failure following injection of solutions containing myohaemoglobin . Q J Exp Physiol 1944; 33:53–70.

5. 5

Ron D, Taitelman U, Michaelson M, Bar-Joseph G, Bursztein S, Better OS. Prevention of acute renal failure in traumatic rhabdomyolysis . Arch Intern Med 1984; 144:277–80.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

6. 6
Reis ND, Michaelson M. Crush injury to the lower limbs: treatment of the local injury . J Bone Joint Surg [Am] 1986; 68:414—8.
[Web of Science](#) | [Medline](#)
7. 7
Meroney WH, Amey GK, Segar WE, Balch HH. The acute calcification of traumatized muscle, with particular reference to acute post-traumatic renal insufficiency . J Clin Invest 1957; 36:825–32.
[CrossRef](#) | [Web of Science](#) | [Medline](#)
8. 8
Knochel JP. Rhabdomyolysis and myoglobinuria. In: Suki WN, Eknoyan G, eds. The kidney in systemic disease. 2nd ed. New York: John Wiley, 1981:263–84.
9. 9
Knochel. Serum calcium derangements in rhabdomyolysis . N Engl J Med 1981; 305:161–3.
[Full Text](#) | [Web of Science](#) | [Medline](#)
- 10.10
Cheung JY, Bonventre JV, Malis CD, Leaf A. Calcium and ischemic injury . N Engl J Med 1982; 314:1670–6.
- 11.11
Guharay F, Sachs F. Stretch-activated single ion channel currents in tissuecultured embryonic chick skeletal muscle . J Physiol (Lond) 1984; 352:685–701.
- 12.12
Christensen O. Mediation of cell volume regulation by Ca²⁺ influx through stretch-activated channels . Nature 1987; 330:66–8.
[CrossRef](#) | [Web of Science](#) | [Medline](#)
- 13.13
Owen CA, Mubarak SJ, Hargens AR, Rutherford L, Garetto LP, Akeson WH. Intramuscular pressures with limb compression: clarification of the pathogenesis of the drug-induced muscle-compartment syndrome . N Engl J Med 1979; 300:1169–72.
[Full Text](#) | [Web of Science](#) | [Medline](#)
- 14.14

Awbrey BJ, Sienkiewicz PS, Mankin HJ. Chronic exercise-induced compartment pressure elevation measured with a miniaturized fluid pressure monitor: a laboratory and clinical study . Am J Sports Med 1988; 16:610–5.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

15.15

Matsen FA III. Compartmental syndrome: a unified concept . Clin Orthop 1975; 113:8–14.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

16.16

Whitesides TE, Haney TC, Morimoto K, Harada H. Tissue pressure measurements as a determinant for the need of fasciotomy . Clin Orthop 1975; 113:43–51.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

17.17

Honda N. Acute renal failure and rhabdomyolysis . Kidney Int 1988; 23:888–98.

[CrossRef](#) | [Web of Science](#)

18.18

Gabow PA, Kaehny WD, Kelleher SP. The spectrum of rhabdomyolysis . Medicine (Baltimore) 1982; 61:141–52.

[Web of Science](#) | [Medline](#)

19.19

Reineck HJ, O'Connor GJ, Lifschitz MD, Stein JH. Sequential studies on the pathophysiology of glycerol-induced acute renal failure . J Lab Clin Med 1980; 96:356–62.

[Medline](#)

20.20

Cushner HM, Barnes JL, Stein JH, Reineck HJ. Role of volume depletion in the glycerol model of acute renal failure . Am J Physiol 1986; 250:F315–F321.

[Web of Science](#) | [Medline](#)

21.21

Zager RA. Studies of mechanisms and protective maneuvers in myoglobinuric acute renal injury . Lab Invest 1989; 60:619–29.

[Web of Science](#) | [Medline](#)

22.22

Hamenbaum W, Gehr M, Grass J, Kaufman J, Hamburger R. Acute renal failure associated with myoglobinuria and hemoglobinuria. In: Brenner BM, Lazarus JH, eds. Acute renal failure. Philadelphia: W.B. Saunders. 1983:269–82.

23.23

Hostetter TH, Wilkes BM, Brenner BM. Mechanism of impaired glomerular filtration in acute renal failure. In: Brenner BM, Stein JH, eds. Acute renal failure. Vol. 6 of Contemporary issues in nephrology. New York: Churchill Livingstone, 1980:52–78.

24.24

Wolfert AI, Oken DE. Glomerular hemodynamics in established glycerolinduced acute renal failure in the rat . J Clin Invest 1989; 84:1967–73.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

25.25

Myers BD, Chui F, Hilberman M, Michaels AS. Transtubular leakage of glomerular filtrate in human acute renal failure . Am J Physiol 1979; 237:F319–F325.

[Web of Science](#) | [Medline](#)

26.26

Palier MS. Hemoglobin- and myoglobin-induced acute renal failure in rats: role of iron in nephrotoxicity . Am J Physiol 1988; 255:F539–F544.

[Web of Science](#) | [Medline](#)

27.27

Shah SV, Walker PD. Evidence suggesting a role for hydroxyl radical in glycerol-induced acute renal failure . Am J Physiol 1988; 255:F438–F443.

[Web of Science](#) | [Medline](#)

28.28

Martin W, Villani GM, Jothianandan D, Furchgott RF. Selective blockade of endothelium-dependent and glycerol trinitrate-induced relaxation by hemoglobin and by methylene blue in the rabbit aorta . J Pharmacol Exp

Ther 1985; 232:708–16.

[Web of Science](#) | [Medline](#)

29.29

Eneas JF, Schoenfeld PY, Humphreys MH. The effect of infusion of mannitol-sodium bicarbonate on the clinical course of myoglobinuria . Arch Intern Med 1979; 139:801–5.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

30.30

Ward MM. Factors predictive of acute renal failure in rhabdomyolysis . Arch Intern Med 1988; 148:1553–7.

[CrossRef](#) | [Web of Science](#) | [Medline](#)

31.31

Hargens AR, Akeson SR, Garfin RH, et al. Compartment syndromes. In: Denton J, ed. Practice of surgery. Philadelphia: J.B. Lippincott, 1984:1–18.

32.32

Collins AJ. Kidney dialysis treatment for victims of the Armenian earthquake . N Engl J Med 1989; 320:1291–2.

[Full Text](#) | [Web of Science](#) | [Medline](#)

33.33

Mithias T, Sansom A. Successful haemodialysis of crush syndrome victims — the Armenian experience. Presented at the 18th Annual Conference of the EDTNA-European Renal Care Association, 1989. abstract.

34.34

Van Waeleghem JP, Verschoot M, Dewets JM, et al. Nephrology aid after seismic catastrophe in Armenia. Presented at the 18th Annual Conference of the EDTNA-European Renal Care Association, 1989. abstract.

35.35

Van Waeleghem JP, Veenstra K, Egiazarian A, et al. Zorab, an earthquake victim with acute renal failure in Armenia. Presented at the 18th Annual Conference of the EDTNA-European Renal Care Association, 1989. abstract.