More on Weightlifting Injuries

Herbert L. Fred, MD, MACP

The preceding *Images in Cardiovascular Medicine* article by Parikh and colleagues¹—limited in narrative and references by *Texas Heart Institute Journal* specifications for *Images* submissions—shows that weightlifting can lead to catastrophe. Presented here is more information on the possible dangers of weightlifting, with a focus on the cardiovascular sequelae.

Weightlifting is associated with 3 categories of injury: musculoskeletal,^{2,3} neurologic,⁴⁻⁷ and cardiovascular.⁸⁻²² Common to all 3 categories are poor conditioning or technique, inadequate strength or endurance, improperly selected resistance, insufficient warm-up or stretching, loss of balance, and fatigue.² Musculoskeletal ailments are reported frequently. Noteworthy neurologic effects, such as subarachnoid hemorrhage,⁴ brain stem dysfunction,⁵ and acute paraplegia,^{1,12} are apparently rare.

Among the cardiovascular sequelae, aortic dissection receives substantial attention⁸⁻¹²; the internal carotid artery,¹³⁻¹⁶ coronary arteries,¹⁷⁻¹⁹ and celiac artery²⁰ can also dissect. In addition, implanted pacemaker leads can fracture.^{21,22} The chief culprit is vascular stress, applied to the arterial walls through exceptionally elevated blood pressure. Indeed, the intra-arterial blood pressure can soar as high as 480/350 mmHg at the moment of maximal weightlifting effort.^{23,24} Investigators attribute this 4-fold rise to mechanical compression of the blood vessels, increased cardiac output, and the same pressor effects that are seen in the Valsalva maneuver.²³ Other contributory factors are emotional stress,²⁵ structural aberrations of the arterial walls, and defective connective tissue in the surrounding extracellular matrix.¹⁶

Certain individuals are at special risk and should lift weights cautiously, if at all: people with chronic systemic hypertension; the elderly, with their comparatively inelastic arteries; persons who have congenital or acquired disease of the aorta; and anyone with a heritable disorder of the connective tissue, such as Marfan syndrome, Ehlers-Danlos syndrome, Turner syndrome, pseudoxanthoma elasticum, osteogenesis imperfecta, and autosomal dominant polycystic kidney disease.^{10,12,16}

Despite its potential for grievous bodily harm, weightlifting—when properly undertaken—yields distinct benefits and is relatively safe for most participants.

References

1. Parikh RV, Alemi F, Kievlan DR, Vu TH, Barnett CF. Acute paraplegia during weightlifting: an unusual vascular catastrophe. *Tex Heart Inst J* 2014;41(4):451-2.
2. Yu JS, Habib PA. Common injuries related to weightlifting: MR imaging perspective. *Semin Musculoskelet Radiol* 2005;9(4):289-301.
3. Risser WL. Musculoskeletal injuries caused by weight training. Guidelines for prevention. *Clin Pediatr (Phila)* 1990;29(6):305-10.
4. Hall Jurkowski JE, Sutton JR, Duke RJ. Subarachnoid hemorrhage in association with weightlifting [abstract]. In: 1983 American College of Sports Medicine annual meeting. May 18-21, 1983 Montreal, Quebec, Canada. Abstracts. *Med Sci Sports Exerc* 1983;15(2):210.
5. Tuxen DV, Sutton J, Upton A, Sexton D, McDougal D, Sale D. Brainstem injury following maximal weight lifting attempts [abstract]. *Med Sci Sports Exerc* 1983;15(2):158.
6. Kyavar L, Heckmann JG. Bilateral peroneal palsy after weightlifting. *Clin J Sport Med* 2013;23(5):400-2.
7. Jordan BD, Istrico R, Zimmerman RD, Tsairis P, Warren RF. Acute cervical radiculopathy in weight lifters. *Phys Sportsmed* 1990;18(1):73-6.
8. Hatzaras I, Tranquilli M, Coady M, Barrett PM, Bible J, Elefteriades JA. Weight lifting and aortic dissection: more evidence for a connection. *Cardiology* 2007;107(2):103-6.
9. Mayerick C, Carre F, Elefteriades J. Aortic dissection and sport: physiologic and clinical understanding provide an opportunity to save young lives. *J Cardiovasc Surg (Torino)* 2010;51(5):669-81.

Dr. Fred is an Associate
Editor of the *Texas Heart
Institute Journal*.

Address for reprints:
Herbert L. Fred, MD, MACP,
8181 Fannin St., Suite 316,
Houston, TX 77054

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10. Ragucci MV, Thistle HG. Weight lifting and type II aortic dissection. A case report. *J Sports Med Phys Fitness* 2004;44(4):424-7.
11. Schor JS, Horowitz MD, Livingstone AS. Recreational weight lifting and aortic dissection: case report. *J Vasc Surg* 1993;17(4):774-6.
12. Hogan CJ. An aortic dissection in a young weightlifter with non-Marfan fibrillinopathy. *Emerg Med J* 2005;22(4):304-5.
13. Kalra G. Carotid dissection from weight lifting [monograph on the Internet]. Available from: <http://www.consultant360.com/content/carotid-dissection-weight-lifting> [2011 Apr 26; cited 2014 Jul 14].
14. Newton KI, Mallon WK, Henderson SO. Nontraumatic intracranial internal carotid artery dissection: a case report. *J Emerg Med* 1997;15(1):19-22.
15. Lin JC, Riles TS, Siller KA, Jacobowitz GR, Rockman CB. Dissection of the internal carotid artery associated with strenuous physical activity. *Resid Staff Physician* 2003;49(7):31-5.
16. Dharmasaroja P, Dharmasaroja P. Sports-related internal carotid artery dissection: pathogenesis and therapeutic point of view. *Neurologist* 2008;14(5):307-11.
17. El-Sherief K, Rashidian A, Srikanth S. Spontaneous coronary artery dissection after intense weightlifting. *Catheter Cardiovasc Interv* 2011;78(2):223-7.
18. Kurum T, Aktoz M. Spontaneous coronary artery dissection after heavy lifting in a 25-year-old man with coronary risk factors. *J Cardiovasc Med (Hagerstown)* 2006;7(1):68-70.
19. Kaminen R, Sadhu A, Alpert JS. Spontaneous coronary artery dissection: report of two cases and a 50-year review of the literature. *Cardiol Rev* 2002;10(5):279-84.
20. Riles TS, Lin JC. Celiac artery dissection from heavy weight lifting. *J Vasc Surg* 2011;53(6):1714-5.
21. Deering JA, Pederson DN. A case of pacemaker lead fracture associated with weightlifting. *Pacing Clin Electrophysiol* 1992;15(9):1354-5.
22. Deering JA, Pederson DN. Pacemaker lead fracture associated with weightlifting: a report of two cases. *Mil Med* 1993;158(12):833-4.
23. MacDougall JD, Tuxen D, Sale DG, Moroz JR, Sutton JR. Arterial blood pressure response to heavy resistance exercise. *J Appl Physiol* (1985) 1985;58(3):785-90.
24. Eleftheriades JA. Beating a sudden killer. *Sci Am* 2005;293(2):64-71.
25. Hatzaras IS, Bible JE, Koullias GJ, Tranquilli M, Singh M, Eleftheriades JA. Role of exertion or emotion as inciting events for acute aortic dissection. *Am J Cardiol* 2007;100(9):1470-2.