DOGMA DETECTIVES CASE # 05-13-13-01: THE SHOCK WAS PALPABLE

It is often said that you can estimate the systolic blood pressure by feeling for the pulse. According to this teaching, if the BP is lower than 80 the radial pulse is lost, if the BP is lower than 70 the femoral pulse is lost, and if the BP is lower than 60 the carotid pulse is lost. Per this paradigm, if there is a radial pulse, the BP is at least 80 systolic. Is there evidence that this actually occurs physiologically or is this just another modern myth of medicine?

Advanced Trauma Life Support introduced this paradigm for estimating blood pressure in its first edition guidelines published in 1985. Subsequent revisions have not emphasized this, but it has persisted in medical dogma. The scientific basis for this assumption was not readily made clear in the original guidelines, nor have the reasons that it has not been reported in recent revisions of the program. Is there any scientific basis to support the original paradigm?

This small observational study was published in the British Medical Journal in 2000. 20 patients were studied over a three year period, all of which were hypotensive due to hypovolemic shock and had invasive BP monitoring (arterial line). The radial pulse always disappeared before the femoral pulse, which disappeared before the carotid pulse. However, in patients with a radial pulse, 10/12 had a blood pressure lower than 80 mmHg. In patients with a femoral pulse, 10/12 had a blood pressure less than 70 mmHg. In those with only a carotid pulse, none had a blood pressure above 60 mmHg. And in those with no palpable pulses, one had a blood pressure of 75 mmHg. This data suggests that the ranges typically taught by ATLS guidelines actually overestimate the actual blood pressure in most circumstances. This study therefore did not support the teaching of the advanced trauma life support course on the relation between palpable pulses and systolic blood pressure. We have also included a link to a very interesting discussion related to letters to the editor regarding this article.
http://www.bmj.com/content/321/7262/673?view=long&pmid=10987771#ref-2
http://www.bmj.com/content/321/7262/673?tab=responses

A similar study was published in Annals of Emergency Medicine in 1988. This study used non-invasive BP monitoring as opposed to arterial lines. Only 25% of the patients in this study had BP accurately estimated by palpation of pulses. False overestimation was greatest in patients with low blood pressures. We thank our colleagues at Academic Life in Emergency Medicine for this summation, as the abstract and data from this article are not otherwise readily available on-line. Again, this research only involves a small sample size.
http://academiclifeinem.blogspot.com/2013/03/is-atls-wrong-about-palpable-blood-pressure.html

These are the only two published articles that exist refuting this paradigm, and they are based on very small observational studies. With this being stated, is there a bigger picture that we can gleam from the subject of palpable pulses and patient outcomes?

An article from Prehospital Emergency Care in 2005 shows that the quality of the pulse (weak vs. normal) has a predictive quality for both blood pressure and mortality. In a study of 342 trauma patients showed that those patients with a “weak” pulse documented on the care report had on average a blood pressure that was 26 mm Hg lower than those with a pulse documented as “normal.” The mortality rate in the “normal” group was 3%, while the mortality rate in the “weak” group was 29%. This had an odds ratio of 15.2 . The conclusion of the researchers was that the quality of the pulse is an accurate screening indicator when triaging the severity of trauma patients.
http://informahealthcare.com/doi/abs/10.1080/10903120500255891

This study from Resuscitation in 2006 evaluated 131 patients that were in severe shock and did not have a palpable blood pressure. The mortality of these patients was 50%. If the patient's blood pressure was restored by pre-hospital interventions, or the patient was hypotensive due to anaphylaxis, the patient had a higher probability of a better outcome.
http://www.sciencedirect.com/science/article/pii/S0300957205003825

So where does this leave us – myth or fact? The Dogma Detectives conclusion for this case is INDETERMINATE. It is unclear what data this assumption was originally based on when the ATLS guidelines were published in 1985. There are two studies that refute this, but they are small observational studies that are only based on a handful of patients. And the one study did uphold the notion that the radial pulse always disappeared before the femoral pulse, which disappeared before the carotid pulse. What is more important to recognize is that weak pulses or absence of pulses is a strong predictor for poor patient outcomes. This was likely the spirit of the original ATLS recommendations. Clinicians should be less concerned about the actual blood pressure number, and respond to and treat all signs of hypoperfusion, regardless of the systolic blood pressure noted.