Utility of urine myoglobin for the prediction of acute renal failure in patients with suspected rhabdomyolysis: a systematic review

Rodriguez-Capote K, Balion CM, Hill SA, Cleve R, Yang L, El Sharif A

CRD summary
This review concluded that there was inadequate evidence to evaluate use of urine myoglobin as a predictor of acute renal failure in patients with suspected rhabdomyolysis. There were limitations in the review and included studies, but the overall conclusion reflected the evidence presented.

Authors' objectives
To determine the predictive validity of urine myoglobin (uMb) for acute renal failure in patients with suspected rhabdomyolysis.

Searching
MEDLINE, EMBASE, AMED and CINHAHL were searched from January 1980 to December 2006 for studies in English. Search terms were reported.

Study selection
Studies that used uMb to indicate acute renal failure in at least three patients with suspected rhabdomyolysis were eligible for inclusion. Studies with myoglobinuria as an entry requirement were excluded. Most studies that assessed test performance used random urine collections and used either colorimetric dipstick or immunometric methods for establishing uMb. Where reported, in studies that reported test accuracy cut offs for a positive immunometric test ranged from 2μg/L to more than 20,000 μg/L. Where reported, cause of rhabdomyolysis was trauma, tetanus, birth asphyxia or mixed causes. Prevalence of acute renal failure ranged from 6.3% to 26.5%.

Two reviewers selected studies. Disagreements were resolved by discussion.

Assessment of study quality
Study quality was evaluated using the 14-criteria QUADAS tool.

The authors did not state how many reviewers performed the quality assessment.

Data extraction
Data needed to construct 2x2 tables of test performance were extracted from studies with at least 20 patients and sensitivity and specificity and 95% confidence intervals (CI) were calculated. Positive likelihood ratios (LR+) and positive predictive values (PPV) were reported.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Studies were combined in a narrative synthesis. Differences between studies were discussed in the text. Study details were tabulated.

Results of the review
Fifty-two studies met the inclusion criteria (n=2,399): 32 case series; 16 cohort studies; and four case-control studies. Of the 52 studies, 87% recruited a representative population, 81% clearly defined inclusion criteria, 98% avoided partial and differential verification bias, 88% blinded interpreters of the index test to the reference standard results; 60% avoided progression bias; <50% did not report sufficient details to allow replication of the tests; and only 38% reported on uninterpretable results.
Only eight prospective studies provided sufficient data for 2x2 tables of test performance to be constructed (n=295, range 21 to 64). These studies were of higher quality and passed most of the QUADAS criteria.

Sensitivity of uMb was 38% (one study), 47% (one study), 86% (one study) and 100% (five studies); specificity ranged from 15% to 91%. Confidence intervals were wide. LR+ were <2.5 (six studies), 4.3 (one study) and 8.6 (one study). PPVs were <58% in all studies.

Authors' conclusions
There was inadequate evidence to evaluate use of uMb as a predictor of acute renal failure in patients with suspected rhabdomyolysis.

CRD commentary
The review addressed a clear research question with broad inclusion criteria. Several relevant sources were searched. Only English-language studies were included and there was no specific search for unpublished studies; therefore, relevant studies may have been missed. Study selection was conducted in duplicate; it unclear whether similar methods to reduce error and bias were employed during data extraction and quality assessment. Only a small subset of the included studies were used to inform the diagnostic performance of uMb; these were the better-quality studies, but had small sample sizes.

There were limitations in the review and included studies, but the overall conclusion reflected the evidence presented.

Implications of the review for practice and research
Practice: The authors did not state implications for practice.

Research: The authors stated that well-designed blinded prospective studies with larger sample sizes and standardised collection protocols, validated uMb methods and comprehensive data collection were needed. High risk of rhabdomyolysis should have their uMb measured daily while the risk remains. Diagnosis of acute renal failure or commencement of therapy to prevent acute renal failure should be measured as outcomes. Dependent upon the results of these studies, RCTs where all patients had uMb measured but were randomised as to whether the results were released may be beneficial.

Funding
Academic Initiatives Program, Department of Pathology and Molecular Medicine, McMaster University.

Bibliographic details

PubMedID
19797717

DOI
10.1373/clinchem.2009.128546

Original Paper URL
http://www.clinchem.org/cgi/content/abstract/55/12/2190

Indexing Status
Subject indexing assigned by NLM

MeSH
Acute Kidney Injury /diagnosis /etiology /urine; Biomarkers /urine; Humans; Myoglobin /analysis; Prognosis; Rhabdomyolysis /complications /diagnosis /urine

AccessionNumber
12010000653

Date bibliographic record published
16/06/2010

Date abstract record published
29/09/2010

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.