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A systematic review and meta-analysis of frequency of acute kidney injury following intravenous contrast administration

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INTRODUCTION

The use of IV contrast and its association with kidney injury has recently been an area of heavy contention. Many guidelines are ambiguous which leaves physicians to use clinical extrapolations. This fuels the contention because some attendings teach residents one way at the dismay of other attending all in the name of evidence. The American College of Radiology (ACR) guidelines are based around a 2013 meta-analysis of studies before 2011. The ACR states that specifically more matched studies need to be done to understand CIN. Propensity matched studies on CIN have been completed since 2011 making it imperative to update the meta-analysis and potentially the guidelines. In fact, Cockrane states a meta-analysis should be updated every three years.

OBJECTIVES

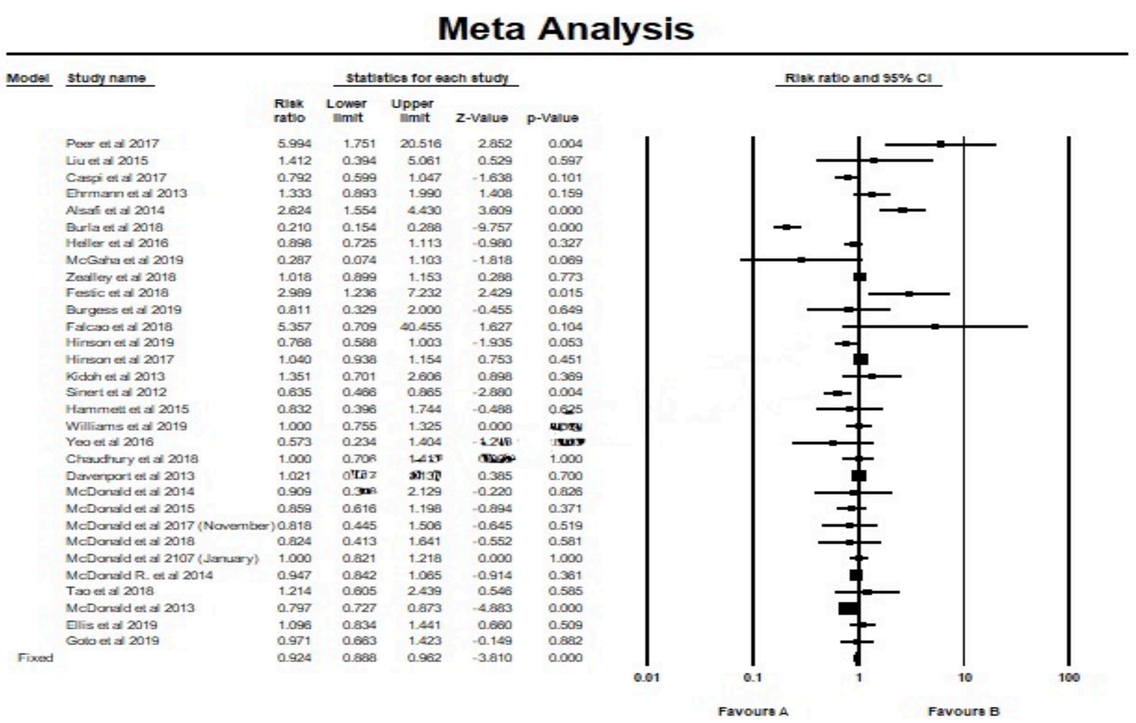
To update a meta-analysis of controlled studies examining the incidence of acute kidney injury (AKI) after exposure to intravenous contrast media compared to AKI after imaging without contrast. This study attempts to collate the new studies conducted with the previous studies to strengthen the evidence base behind related clinical recommendations and to give physician clear evidence to base their decision making.

METHODS

EMBASE, Scopus, and Medline were searched using the same search criteria as the 2013 meta-analysis with the time period of interest changed from before 2011 to 2011 to present. Abstract and full text screening followed the same criteria as the original meta-analysis. The same data points as the previous meta-analysis were recorded. Data from the previous meta-analysis was combined with our data, and all data were analyzed. Relative risk was calculated for incidence of AKI in both groups.

RESULTS

Figure 1



Meta Analysis

There were 8,358 studies identified. Of those, 34 (0.004%) were deemed to have met inclusion criteria; this represented 30,053,234 patients (1,731,241 receiving IV contrast and 28,321,993 not receiving contrast). There was 30 retrospective studies, 13 on which were propensity matched. There were only 4 prospective studies and 2 of those were propensity matched. The risk of AKI in the contrast medium group of the retrospective studies (RR= 0.9805; 95% confidence interval [CI]: 0.97, 0.99; p=0.0000000015) and prospective studies (RR= 1.009; 95% confidence interval [CI]: 0.81, 1.26; p= 0.934) was similar to the non-contrast medium group. The combination of retrospective and prospective studies with the previous meta-analysis findings also showed a similar risk (RR= 0.9806; 95% confidence interval [CI]: 0.97, 0.99; p= 0.0000000016) between contrast medium and non-contrast medium groups. There was one particular population based study that contained over 29 million patients. In recognizing that this study would most likely overshadow our results we completed a separate analysis without this study. The combination of retrospective and prospective studies without the population based study showed the same endpoint to be true; the risk for AKI after contrast exposure was the same as the risk for AKI without contrast exposure (RR=0.924; 95% confidence interval [CI]: 0.88, 0.96; p=0.000139).

CONCLUSION

The meta-analysis from 2013 stated there was no difference in incidence of AKI between contrast exposure groups and control groups. Our data support this finding. Guidelines should be updated to reflect current research. Physicians can be reassured that there is no link between IV contrast use and kidney injury. Further, it is imperative to change teaching practices to reflect our change in understanding of this issue so that we are not continuing to propagate outdated understandings and continue to practice evidence based medicine. More studies need to be done on PCI and angiography to determine if the cause of kidney injury after these procedures is truly contrast induce or if there is a confounding variable.

REFERENCES

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