Nephrogenic Systemic Fibrosis: Incidence reduction with screening and use of gadobenate dimeglumine

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Introduction: Nephrogenic Systemic Fibrosis is a newly discovered systemic fibrosing disease which has been linked to gadolinium based contrast agents, in the setting of other risk factors (1,2,3). Most biopsy proven cases of NSF have occurred after administration of gadodiamide, which was the case at our institution (4,5). Clinical guidelines were developed by a group of nephrologists, radiologists and dermatologists at our institution in an attempt to prevent any further cases of NSF. The purpose of this study was to assess the impact of these clinical guidelines which included screening inpatients for various risk factors and using gadobenate dimeglumine instead of gadodiamide in those identified at risk for NSF at our institution. Secondly, we assessed the incidence of NSF in all patients, regardless of hospitalization status, with an estimated glomerular filtration rate (eGFR) of less than 30 ml/min/1.72m².

Methods: This study is IRB exempt and was performed to assess clinical practices of gadolinium based contrast agent usage at our institution. Retrospective analysis was performed of all patients at our institution presenting to the radiology department for a contrast-enhanced MR examination between July 1, 2005 and July 30, 2008. For the time period November 2006 thru July 2008 we determined the number of patients, both inpatients and outpatients, who underwent a contrast-enhanced MR examination with an eGFR less than 30 ml/min/1.72m². For the 1 year periods, July 2005 thru June 2006 and November 2007 thru October 2007, we determined the number of high risk inpatients undergoing contrast-enhanced MR examination. Patients were considered at high risk if the contrast enhanced MR examination was performed on an inpatient with an eGFR < 60 ml/min/1.73m², and who was admitted for a pro-inflammatory state (e.g. recent surgery, major infection, vascular thrombosis or liver transplantation). Gadobenate dimeglumine was used in all hospitalized patients considered high risk and all outpatients with an eGFR less than 30 ml/min/1.72m² between November 2007 and July 2008, whereas gadodiamide was used in all patients, outpatient and inpatients, in the time period July 2005 thru June 2006, in accordance with clinical practice at our institution. Incidence of NSF was computed for both 1-year time periods in the high risk inpatient population and during the time period November 2006 and July 2008 in all patients with an eGFR less than 30 ml/min/1.72m².

Results: During the time period July 2005 – June 2006, 131 contrast enhanced MR exams were performed on inpatients satisfying the high risk criteria (Figure 1). Six cases of NSF were diagnosed during this time. During the time period November 2006 and October 2007, 115 contrast enhanced MR exams were performed on inpatients satisfying the high risk criteria (Figure 2). Zero cases of NSF were diagnosed during this time. This difference between gadobenate dimeglumine and gadodiamide in the high risk population is statistically significant (p = 0.04). During the time period November 2006 thru July 2008, 371 contrast enhanced MR exams were performed on patients, regardless of hospitalization status, having an eGFR of less than 30 ml/min/1.72 m², with no cases of NSF occurring in this time period.

Conclusion: In November, 2006, a screening protocol was developed at our institution in which inpatients meeting high risk criteria and outpatients with an eGFR of less than 30 ml/min/1.72 m² received gadobenate dimeglumine rather than gadodiamide. Our data reveal a significantly lower incidence of NSF during the time period when screening was occurring. Developing NSF risk reduction guidelines and reassessing the impact of these guidelines at a particular institution are helpful for physicians who need to weigh the risks of NSF against the risks of not performing a medically necessary contrast enhanced MRI.