

Introduction

This study assesses the impact on radiation dose of EOS™ imaging system versus computed or digital radiography (CR/DR) to assess fecal burden on abdominal radiographs in children undergoing bowel management programs.

Design/Sample

Following IRB approval, we retrospectively identified 56 patients in Shriners Hospitals Northern California's Bowel Management Program who were being treated for chronic constipation and who had abdominal/pelvic radiographs to evaluate stool burden obtained with the EOS™ imaging system between 07/01/2017-05/30/2018. 17 were excluded because they had not also had DR/CR of the abdomen and pelvis at some point during that time period. Our final cohort was 39 patients.

Analysis

We compared dose area product (DAP) for EOS™ imaging system radiographs with DAP for CR/DR radiographs on the same patients. Dose comparison was performed with calculation of difference, percent dose reduction, and paired t test.

Results

Percent reduction in DAP ranged from 17.9% to 94.5%. Mean dose with images obtained with the EOS™ imaging system showed an overall decreased radiation dose of 82% when compared to mean CR/DR DAP (p=0.005).

Summary

There is a constant drive for radiation dose reduction in children. The Image Gently campaign and ALARA (as low as reasonably achievable) principle promote using the lowest possible radiation dose, while obtaining diagnostic imaging. EOS™ imaging system allows for especially low radiation dose by being sensitive to photons and reducing scatter radiation. It utilizes slot scanning to image upright patients, acquiring AP and lateral images simultaneously, in two and/or three dimensions. The main clinical application of EOS™ imaging system is for orthopedics, specifically evaluation of bone alignment.

We found that the EOS™ imaging system's ability to decrease radiation dose while maintaining diagnostic image quality has another application. It is useful for children enrolled in bowel management programs. These children undergo multiple clean-out regimens and other bowel hygiene programs, and require serial radiographs to evaluate stool burden. EOS™ imaging system makes it possible to evaluate trends in stool burden—and treatment efficacy—using lower radiation dose than CR/DR, without losing important diagnostic information. It is also helpful for children who require documentation of stool burden for other reasons as well.



Abdominal radiograph obtained with EOS™ imaging system clearly depicts moderate stool burden.

Conclusions/Further study

An abdominal radiograph with short exposure time performed by EOS™ imaging system may decrease DAP compared to DR/CR in children in bowel management programs who have serial radiographs to evaluate stool burden. EOS™ imaging system may have additional applications outside of orthopedic surgery that would allow significant radiation dose reduction for pediatric patients.

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