Perianal Imaging in Pediatric IBD - 1.5T versus 3T

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PURPOSE AND BACKGROUND

Our hypothesis was that pelvic MRI in children is comparable in perianal disease (PAD) detection at 1.5T and 3T. A secondary aim was to describe the frequency of perianal fistula (PAF) types in children with pediatric inflammatory bowel disease (IBD) using Parks' criteria.

Pelvic MRI is the gold standard in adults, now also considered so in children, for PAD detection, classification, prognostication and treatment response.(1-3) PAF and perianal abscesses (PAA) are usually described according to Parks' or the St James's University Hospital (SJUH) classifications.(4, 5) Both Parks' and SJUH classifications were developed in adults and are typically also used in children. A recent pediatric review considered Parks' classification more suitable in children given its use of the coronal plane in describing fistulous tracks and the shorter pediatric anal canal better assessed in this plane. (6) There are different reported frequencies of PAF types between adults and children, although the pediatric cohorts are small (3, 7) To our knowledge, perianal imaging and disease classification in children at 1.5T versus 3T has not been widely assessed.

METHOD

Pelvic MRIs performed in a 2-year period at single tertiary pediatric center in pediatric IBD patients with known or suspected perianal disease, confirmed with recent MR Enterography and electronic patient chart review, were included in the study. Inclusion criteria were children and adolescents 18 years or younger having a pelvic MRI using the standard institutional technique targeting the perianal region performed at 1.5 or 3T, identified by PACS audit. MRIs were excluded if a non-standard pelvic MRI technique was used, or one or both reviewers deemed images non-diagnostic. Pelvic MRI studies in the same patient performed outside the study period or at other centers were not captured. Images were independently reviewed by a pediatric radiologist and a pediatric radiology fellow, with 15 and 9 years experience respectively interpreting pelvic MRI. A consensus read was performed if there was discrepancy between readers in the presence, absence and/or number of PAF and PAA recorded. Reviewers were blinded to the indication for pelvic MRI referral, radiology report and clinical information including IBD sub-type. Descriptive statistics were used for the number, classification, location and length of PAF; and the number, location and volume of PAA, and compared to identify differences in perianal disease detected at 1.5T and 3T as a group.

RESULTS

Ninety-four children underwent 133 pelvic MRI between January 2011 and February 2013, 60 males and 34 females. Age at initial MRI ranged between 5.3 and 18.6 years (mean 14.3 years). The age and gender distribution for studies performed at 1.5 and 3T was similar. Majority had a diagnosis of Crohn's disease (CD) at initial MRI - 66 (70%), with 26 (28%) indeterminant IBD (IBD-U), and 2 (2%) with ulcerative colitis (UC).

Of the 133 pelvic MRI, 93 (70%) were performed at 1.5T, across different vendors, and 40 (30%) at 3T, on a single vendor. Most (92) were done as single scans, with 2/3 performed at 1.5T and 1/3 at 3T. The remaining 41 pelvic MRI scans were multiple scans in individuals, between 2 and 5, again mostly performed at 1.5T. At 1.5T, 105 PAF were identified in 93 MRI scans, 60 (57.1%) trans-sphincteric and 45 (42.8%) inter-sphincteric. Most PAF (20) were at 6 o'clock, 64% between 5 and 7 o'clock, length ranging between 5-82 mm. PAA, 45 in total, occurred most frequently at 6 o'clock (33%) and 12 o'clock (17.8%), volume ranging from 0.01 – 7.2 ml. The total number of normal studies was 5 of 93 (5.4%). At 3T, 47 PAF were identified in 40 MRI scans, 27 (57.4%) trans-sphincteric and 20 (42.6%) inter-sphincteric. Most PAF (42) were at 6 o'clock, 62.8% between 5 and 7 o'clock, length ranging from 3-74 mm. PAA, 19 in all, occurred with decreasing frequency at 6, 12 and 3 o'clock, volume ranging from 0.1 – 115 ml. The total number of normal studies was 3 of 40 (7.5%). Table 1 summarizes key perianal disease descriptors and frequencies, with no statistical difference between findings at 1.5T and 3T.

TABLE 1: Perianal disease on pelvic MRI at 1.5T and 3T in pediatric IBD

MRI	# SCANS	# PAF	PAF TRANS-SPHINCTERIC	PAF INTER-SPHINCTERIC	# PAA	NORMAL
1.5T	93	105	60 (57.1%)	45 (42.8%)	45	5 (5.4%)
3T	40	47	27 (57.4%)	20 (42.6%)	19	3 (7.5%)

DISCUSSION

Pro rata, the number and location of PAF and PAA and fistula type was almost identical at 1.5T and 3T. PAF were most frequently seen between 5 and 7 o'clock in both groups and abscesses at 6 and 12 o'clock. Trans-sphincteric PAF were marginally more frequently described than inter-sphincteric PAF in both groups, with no supra or extra-sphincteric fistulae identified. This differs from other studies (3,7), with a higher rate of inter-sphincteric PAF and absence of supra or extra-sphincteric PAF in our patient population at 1.5 T and 3T. Our study is limited by its retrospective nature and the limited number of patients undergoing pelvic MRI at both 1.5T and 3T in a comparable timeframe, precluding direct comparison.

CONCLUSION

The spectrum of perianal fistula and abscess frequency, type and location is comparable at 1.5T and 3T in children and adolescents with IBD, supporting the validity of imaging this patient population for PAD at both field strengths. The frequency of PAF types differs from those typically reported in adults and some pediatric studies, and raises the question of different patterns of perianal disease in pediatric IBD, just as intestinal involvement differs between adults and children with Crohn's disease.

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