

QUANTITATIVE 3D MRCP-DERIVED DILATATION SCORE IN THE ASSESSMENT OF PRIMARY SCLEROSING CHOLANGITIS.

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Background: Magnetic resonance cholangiopancreatography (MRCP) is the non-invasive imaging modality of choice in establishing the diagnosis, detection of biliary complications and monitoring progression in primary sclerosing cholangitis (PSC). However, acquisition and image reconstruction protocols vary across centres. Furthermore, there is currently no standard model for interpreting MRCP data resulting in high inter-observer variability in descriptive assessment even among experts. We investigated the use of an objective dilatation score derived from the standardised quantitative biliary imaging tool, MRCP+ (Perspectum Diagnostics, Oxford, UK), in the assessment of PSC.

Methods: T2-weighted 3D MRCP was prospectively performed in 40 patients with large-duct PSC and 12 healthy volunteers (HV). MRCP images were processed with the MRCP+ software to first enhance and quantify tubular structures and then generate a 3D model of the biliary tree (Figure 1). A minimum of 1mm increase and 30% change in diameter compared to neighbouring minima was required to be defined as a candidate dilatation. The product of measured length of dilatation and percentage increase in diameter of dilatation was defined as the dilatation score. Quantitative metrics were compared between the two groups. Patients with PSC were risk-stratified according to previously published cut-off of serum alkaline phosphatase (ALP) greater than 1.5 times upper limit normal (\times ULN) to identify higher-risk patients.

Results: The mean age of patients with PSC was 45.2 ± 14.4 years (68% male) with a mean duration of diagnosis of 8.8 ± 5.9 years. 63% had inflammatory bowel disease (43% ulcerative colitis) and 58% were on ursodeoxycholic acid. The mean age of HV was 34.4 ± 7.9 years (67% male). The median number of dilatations in PSC was significantly higher than in HV (12.0 vs 1.5, $p < 0.0001$). Patients with PSC also had a significantly higher median dilatation score (49.3 vs 6.1, $p = 0.0003$) which correlated with ALP relative to ULN ($r = 0.40$, $p = 0.01$). Patients with serum ALP greater than 1.5 \times ULN had higher median dilatation score than lower risk patients (93.3 vs 36.2, $p = 0.02$).

Conclusion: Quantitative MRCP-derived dilatation score is significantly higher and shows promising risk-stratification ability in a well-characterised cohort of patients with PSC. Quantitative biliary imaging using a standardised 3D MRCP protocol offers the opportunity to develop objective and reproducible imaging markers in addition to conventional qualitative assessment of bile ducts. Follow-up data from this study will investigate the prognostic ability of dilatation score to predict radiological progression and clinical endpoints in PSC.

Figure 1: 3D biliary model of a healthy volunteer (left) and a patient with PSC (right) generated by quantitative MRCP and colour coded according to duct diameter.

