

# Introduction

Magnetic resonance cholangiopancreatography (MRCP) is a well-established non-invasive imaging technique used for the assessment of the normal anatomy, anatomical variants and pathologies of the intra-hepatic and extra-hepatic bile ducts as well as the pancreatic duct. Typically, MRCP uses T2 heavily weighted images where bile and pancreatic juices appear hyperintense relative to the surrounding tissues. Protocols of MRCP currently use two and three-dimensional techniques.

The two-dimensional sequences include thin section MR imaging gives contiguous images with no gap and thick-slab MR images provide an overview of the anatomic structures with the goal of capturing the entire biliary tree or pancreatic duct on one image.

The three-dimensional sequences produce images that are contiguous. These images are ideal for multiplanar and minimal intensity projection (MIP) reconstructions. With recent technical advances better image quality is obtained, which is achieved with the coronal 3D isotropic TSE sequence. This sequence provides detailed anatomical information for delineation of small anatomical structures as well as allows multiplanar and volumetric reconstruction.

# Aim of the work

The aim of this study was to evaluate the role of coronal isotropic 3D T2-weighted turbo-spin-echo sequence in addition to the routine MRCP sequences in the evaluation of the biliary tree.

# Patients and Methods

**PATIENTS:** This study was conducted on 100 patients with clinical pictures suggestive of underlying biliary tract abnormalities and referred to the department of Radiodiagnosis for further MRI imaging evaluation.

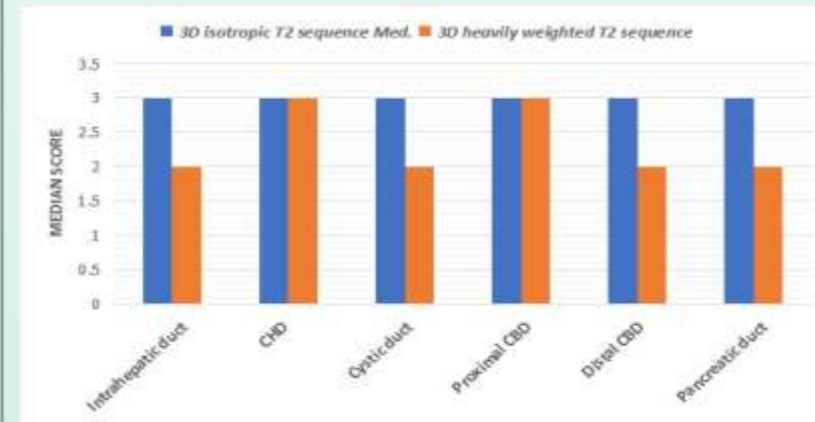
**METHODS:** Each MRCP study was thoroughly examined as regards the conspicuity of the ducts, motion artifacts and the pathological findings as well as the anatomical variants.

Motion artifacts were rated with a score from 1 to 4 where a score of 1 is given when the image is not diagnostic due to the artifact; 2 when the image has major artifacts; 3 when the image has minor artifacts and 4 when the image has no artifacts.

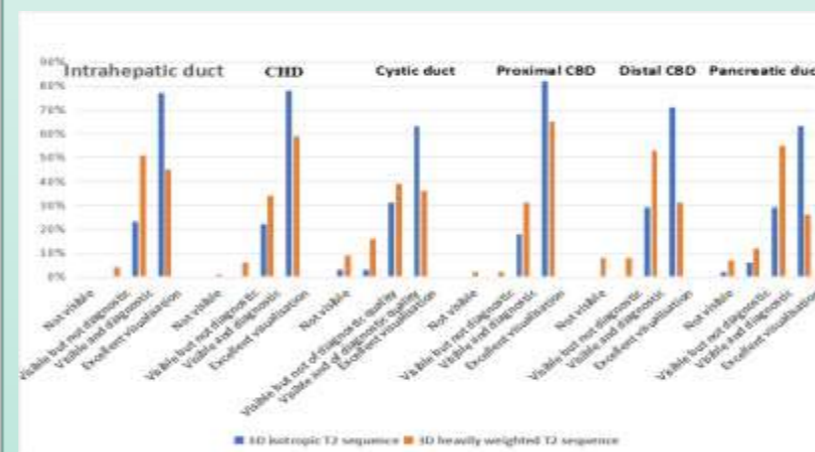
The biliary tree was divided into intrahepatic ducts, common hepatic duct, cystic duct, common bile duct (which was further divided into distal segment and proximal segment) with the pancreatic duct were evaluated according to the conspicuity of these ducts. The conspicuity of these ducts is also rated by a score from 0 to 3 where 0 stands for not visible; 1 for visible but not diagnostic; 2 for visible and diagnostic and 3 for excellent visualization of the duct.

# Results

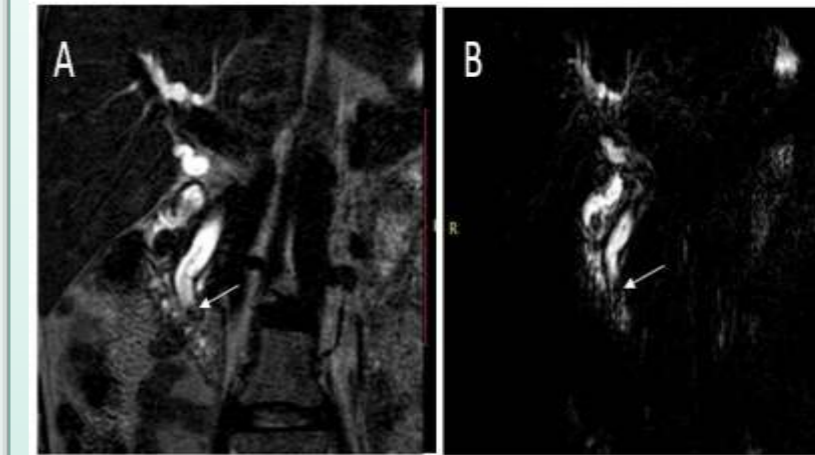
The isotropic 3D sequence showed statistically significant difference ( $P < 0.01$ ) in the different segments of the examined biliary tree and the pancreatic duct in aspects of duct visualization and image quality in terms of motion artifacts.



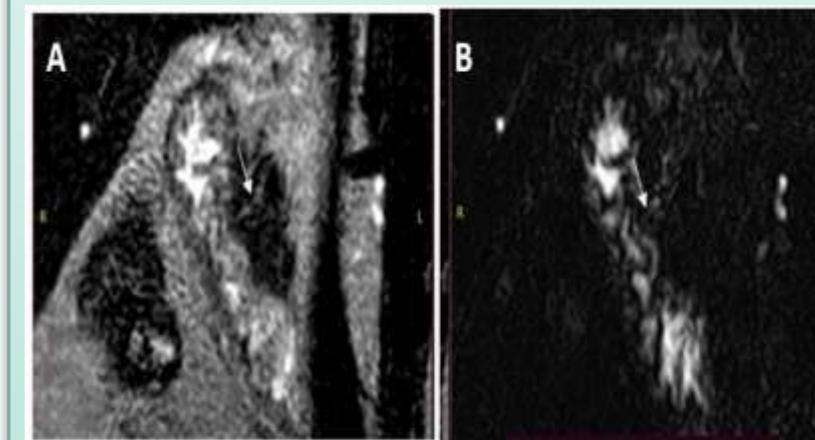
**Figure 1:** graph shows the duct conspicuity of the examined segments of the biliary tree.



**Figure 2:** A graph shows the duct conspicuity of the six segments of the biliary tree.



**Figure 3:** A: 3D isotropic T2 sequence image (coronal view); the distal CBD (white arrow) is seen of excellent visualization (score=3), B: 3D T2 heavily weighted sequence image (coronal view); the distal CBD (white arrow) is visualized and diagnostic (score=2). In this case the distal CBD shows an obstructing stone.



**Figure 4:** A: 3D isotropic T2 sequence image (coronal view); the distal CBD (white arrow) is seen of excellent visualization (score=3), B: 3D T2 heavily weighted sequence image (coronal view); the distal CBD (white arrow) is visualized and diagnostic (score=2). In this case the distal CBD shows a benign looking stricture.

# Conclusion

- The 3D isotropic T2 sequence is of added value in the visualization of the ducts and the diagnosis of the biliary and pancreatic duct lesions.
- The 3D isotropic sequence statistically showed more duct conspicuity and less motion artifacts.
- This sequence can help to get maximum intensity projection reconstruction, volume rendering and multiplanar reconstruction from the acquired coronal images.
- Adding the 3D isotropic T2 sequence to the MRCP protocol in examining the biliary tree adds more to the diagnostic accuracy yet adds little more time. We recommend adding it for better diagnostic ability despite the long acquisition.