Case Study | Innovative Application

MRCP Protocol Enhancement: Auto-tracker Prescription and 3D MRCP with HyperCube and HyperSense

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Introduction

Variability in abdominal imaging can occur from patient to patient. Patients breathe at different rates and many, depending on the acuity of their illness or condition, may be able to hold their breath only for a limited time and without repetition. Manual placement of a body navigator can lead to improper positioning, such as capturing too much of the lung or too much of the liver. It is also possible to accidentally place the Body Navigator in the large vessels of the liver.

GE Healthcare’s Auto Navigator technique tracks the liver throughout the respiration cycle and delivers RF consistently throughout the duration of the scan. Auto Navigator Placement automates placement of the tracker on the dome of the liver. During the scan, the technologist can adjust the threshold and acceptance window if the patient starts breathing more shallow during the scan.

Additionally, high-resolution scanning enables visualization of small pathologies within the biliary system, such as the ducts in the pancreas. HyperCube delivers a small field of view (FOV), organ-specific volumetric imaging acquisition that can reduce artifacts originating from outside of the prescribed FOV. It can be applied with or without fat suppression using Flex or chemical saturation methods. Using HyperSense allows us to achieve resolution in a reasonable time that we were not able to get before without increasing the noise in the image. By preserving SNR with this new parallel imaging technique, we can increase overall spatial resolution and improve image quality.

Patient history

A 67-year-old patient referred for control after cholecystectomy.

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MRCP Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR, ms</td>
<td>5000</td>
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<tr>
<td>TE, ms</td>
<td>706</td>
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<tr>
<td>ETL</td>
<td>140</td>
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<tr>
<td>FOV, cm</td>
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<tr>
<td>Slice thickness, mm</td>
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<tr>
<td>Phase</td>
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<tr>
<td>Frequency</td>
<td>352</td>
</tr>
<tr>
<td>Scan time, min</td>
<td>4:16</td>
</tr>
</tbody>
</table>
MR technique

MRCP protocol:
Free-breathing 3-plane Loc with auto tracker prescription
Coronal T2 SSFSE BH
Axial T2 enhanced SSFSE BH
Axial T2 FS enhanced SSFSE BH
Coronal 3D Navigated MRCP with HyperCube/HyperSense

MR findings
Choledochus duct ectasia and cystic lesions adjacent to the pancreatic duct.

Discussion

Autotacker prescription simplifies the workflow of an MRCP examination and helps avoid additional time for correct prescription of the Navigator tracker. When applied together to a 3D MRCP sequence, HyperCube and HyperSense help to achieve higher spatial resolution, which is essential to the detection of small lesions and visualization of thin biliary ducts. At the same time, HyperCube and HyperSense reduce the scan time and avoid wraparound artifacts from structures outside of the FOV.

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Triemli Spital is a 550-bed facility in Zurich, Switzerland.