

Improving MRI workflows using the ProBelt system

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Background

Fixation straps and fixation belts are part of the standard equipment at every MRI and are used in many different ways. Even in outpatient facilities, where a very high level of patient compliance can be assumed, fixation straps are indispensable, for example for securing torso coils.

Aspects such as simple application, perfect hygiene and the impact on patient comfort are crucial to mastering the ever-increasing number of examinations coupled with increased demands.

As part of a project to further optimise the workflow at the MRI, the use of the fixation straps was critically investigated and an alternative solution was evaluated. For this purpose, different areas of application of the standard fixation straps and the respective workflows were first documented. Thereafter, the ProBelt (Pearl Technology AG, Switzerland) was reviewed as an alternative.

Challenges

At the institute, work is carried out on a Philips Achieva 3T. The examination spectrum covers all common MRI exams, such as examinations of the head, upper and lower extremities or abdominal, breast and prostate MRIs. Both, dedicated (head, knee, ankle, wrist, etc.) as well as flex coils (semi-flex, ring coil, torso coils) are used.

The standard hook-and-loop straps are available in various designs and are used in different ways.

Long hook-and-loop strap on XL torso coil

- Fixation of the XL-Torso coil on thorax, upper body and lower body, e.g. for MRI thorax or MRI abdomen (Figure 1)

Long hook-and-loop strap as a wrap

- Fastening of respiratory triggers, e.g. for abdominal MRI
- Ring-coil fastening, e.g. for shoulder examination (Figure 2)



Figure 1: Fixation of the XL-Torso coil on the ribcage



Figure 2: Hook-and-loop strap for fastening the ring coil

During the structured observation of the workflows, it was found that the process of attaching the XL torso coil requires numerous steps and can take several minutes. Two hook-and-loop straps are attached to the torso coil on each side. In case of patients with big body circumference, additional straps may be necessary. Due to the soft, fabric-like surfaces, the fixation straps keep slipping, which can lead to suboptimal positioning of the coil and thus slows down the workflow. This effect is particularly noticeable when using two fixation straps together with the flex coil for shoulder examinations (Figure 3).

The hygiene concept requires that the straps are washed in the washing machine after each examination. To be able to guarantee this, several sets must be kept in stock. In addition, washing and the associated building of knots and fraying have a negative effect on the appearance and functionality of the straps (Figure 3). Dust, fuzz and other soiling can hardly be removed and make regular replacement of the straps indispensable.



Figure 3: Due to continuous washing, the hook-and-loop system does not work optimally, and it makes the fixation belt look unhygienic.

Solution

Due to suboptimal workflows and the hygiene deficiencies, it was decided to evaluate alternative solutions for fastening the coils. The so-called ProBelt system was used. The ProBelts are made of a durable, slightly elastic and only 0.4mm thin polyurethane foil. They are permanently attached to the Philips "standard mount"

by means of snaps (Figure 4). The straps are completely hook-and-loop-free and can be adjusted to the desired circumference almost infinitely by means of a simple button-hole-system.



Figure 4: ProBelts are attached to the existing Philips mount (white eyelets) by means of snaps.

The ProBelt system was used in more than 100 patients within the first three months, including the subsequent examinations with XL-Torso or Flex-Ring coils:

- Fastening of breath trigger (Figure 5)
- Thorax and thoracic wall
- Upper arm
- Shoulder with ring coil (Figure 6)
- Thigh / Lower leg
- Pelvis / Hip
- Abdomen (Figure 7)



Figure 5: Fastening of respiratory trigger



Figure 6: Ring coil with ProBelt



Figure 7: Fastening the XL torso coil with ProBelt

In the daily routine, it was found that the difficulties observed with the fabric belts could be largely solved using ProBelts.

1. Setup is simplified and accelerated thanks to the permanent fixation to the "standard mount" by means of snaps. The straps are simply moved along the rail to the correct position and then closed over the coil. The time saved per patient is more than 2 minutes, as the belt no longer needs to be retracted.
2. Due to the surface, the ProBelt «sticks» much better to the Flex or XL torso coil and the danger of slipping is minimised.
3. The slight elasticity of the material together with a button-hole-mechanism allow the use on patients of all sizes. For very strong patients (>120 kg) the belt extension «ProBelt Extension» is recommended.

4. After use, the ProBelt is simply wipe-disinfected and is ready for use again after a few seconds. This minimises the cleaning effort and even after 3 months of use, the belts still look like new.

The team also observed that, thanks to the thin foil, the ProBelt transfers no pressure from the XL torso coil to the thorax or stomach area when the respiratory trigger is attached and is therefore perceived much more comfortably.

Conclusion

With the ProBelt system optimised for the Philips MRI, various improvements have been achieved. Workflows have been simplified and accelerated, hygiene requirements are fully complied with, and patient feedback has been consistently positive. Due to the positive experiences, the ProBelt was adopted into standard patient operation after only a short trial period and is now in regular use.



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