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A Flat Patient's Table to Prevent Malpositioning of the Patient: An Illustrated Case Study in Radiology

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Abstract

There is a design issue in most of the CT scanners patient table/couch that cause the patient to be in a tilted position. There for a new design must help the patient to be centrized. The design need to make a few changes to the patent's couch. All manufacturing companies make this mistake. This paper will address the issue in details.

Keywords: Computed Tomography; Pateint Table; Patients Position; Radiology

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Introduction

There have been many design issues in radiology machines reported before[1-3]. The patient couch is design in some CT scanner as curved couch which make the patient in a malposition. The malposition can make the organs to move to the low side. Even in a minor fashion, but it is still can cause misdiagnosis. In order to use the curved patient couch, a bubble level scale must be used to make sure the patient is 100% centerized which is crazy. The easiest solution is to make a flat patient couch which will solve the whole issue see (Figures. 1 thru 6).

Design Issue

This is an old Siemens CT scanner, but they still make the same mistakes in newer scanners. As well, General Electric, Philips, Toshiba, Canon, and Hitachi. All of them have the same mistake which makes the patient positioning above the table hard to do. The laser beam centering is used, but the patient still not centerized 100%. The laser centering will be on the accurate spot, but the patient legs or lower trunk could be shifted to one side of the table. Some patient might have scoliosis which make them twisted on the couch or any other medical condition. The idea of making a curved patient table is a huge mistake. The flat table can have a radiolucent cushion to make the patient comfortable on the flat patient table. As well, in emergancy suitaions where the patient –some times when the patients are brought by the

relatives, not the EMS services- not on a hard board, then it will make the patient lie on non-straight surface which is not good for the spine in case of trauma. Even with patients on hard board it will make centering the hard board a difficult task. Because the table is curved and the patient could be on any part of the board. Pushing the patient on the board or sliding the

patient on the board is not an option to avoid causing harm in case of spine fracture. So you have to centralize the patient, not the board which will make the patient be tilted to one side more than the other. All of these issues are facing radiographers because the patient table was poorly designed by “non- radiology experts”.



Figure 1: The curved patient table.



Figure 2: The curved patient table which cause malposition.



Figure 3: The curvature of the patients' couch.

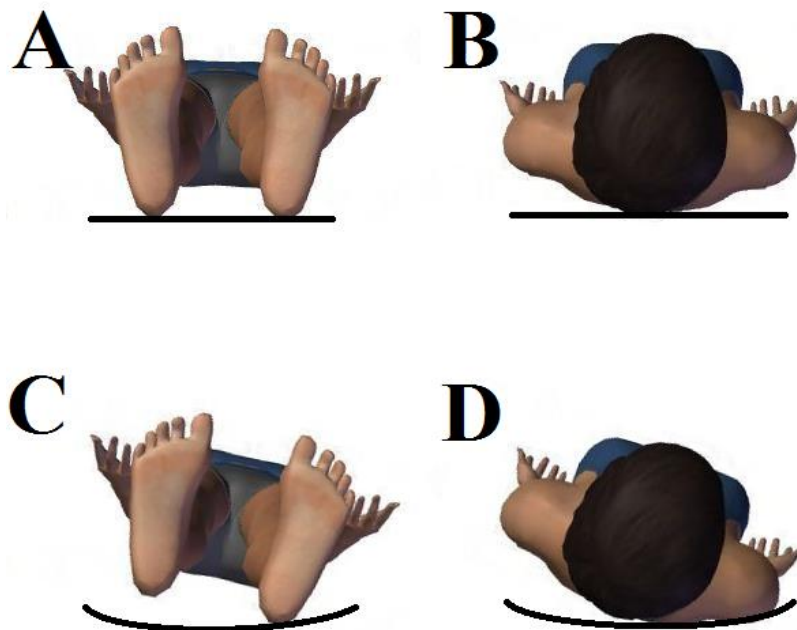


Figure 4: The patient position on both the flat tables (A & B) and the curved table (C & D).

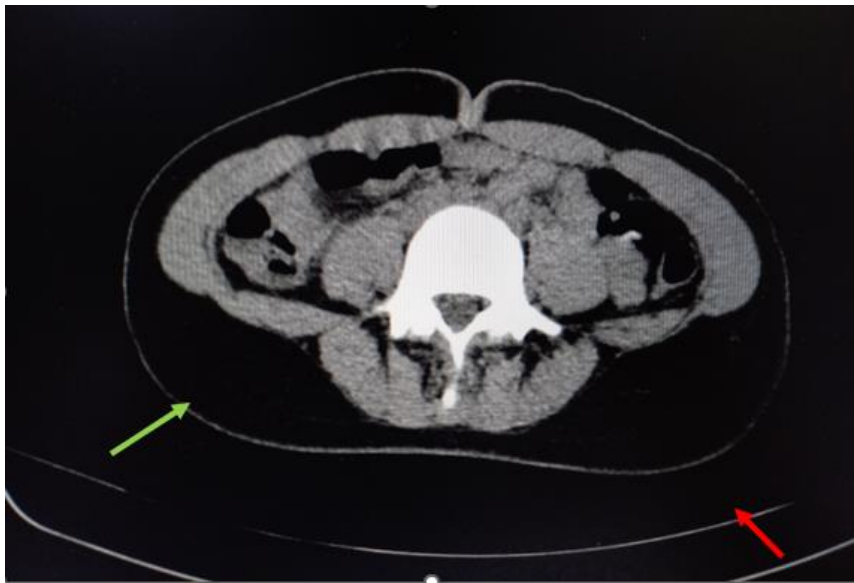


Figure 5: An abdomen CT scan shows the skin line (the green arrow) and the curved table top (the red arrow). The CT shows the patient tilted to the left side.

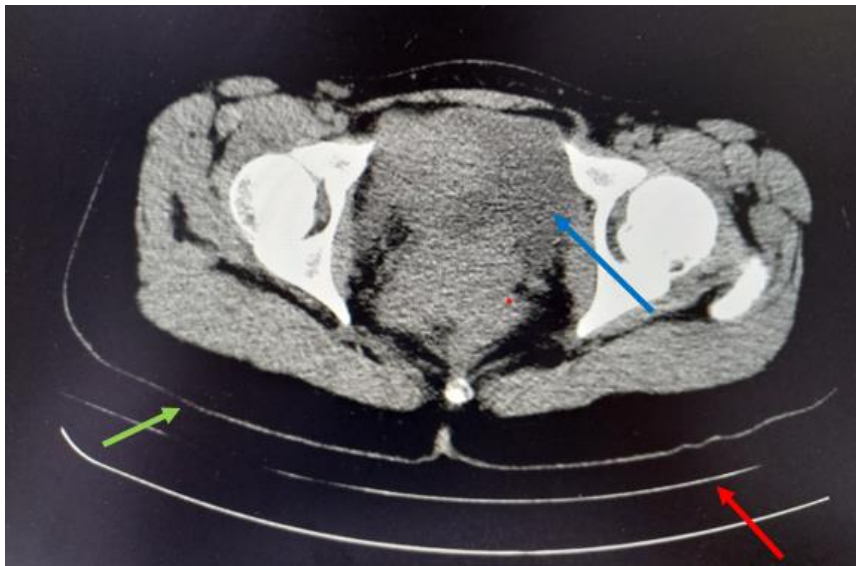


Figure 6: A pelvis CT scan shows the urinary bladder falling to the left side (the blue arrow), skin line (the green arrow), and the curved table top (the red arrow). The patient appears to be centralized, but a little bit tilted to the left side which made the bladder only on one side which can be misdiagnosed as a uterine cyst for non-experienced health professionals.

Affected Organs

There is a list of organs that can be affected with a tilted positions on the patients' table. Some of these organs are: the brain, the stomach when it

is full, the urinary bladder when it is not empty, gallbladder, the liver, the bowel, the heart, the lungs when it has fluids, etc. Basically, any organ that has some fluid, the shift will be obvious. Other organ might appear in a wrong

position due to the lack of accurate positioning. As well, in cases of pathologies like a cyst or ascites, it can appear directing to the lowest level near the table top.

Central Line

The patient couch should have a red line in the center of the couch so the patients will know

where they supposed to be centralized. Many X-ray bucky have the lines to help the patients' to be centralized. The issue is the lines might not be in a distinct color. If the line is in red color for example, all patient will see it when you ask them to be centralized on the red line in the middle of the table see (Figure 7).

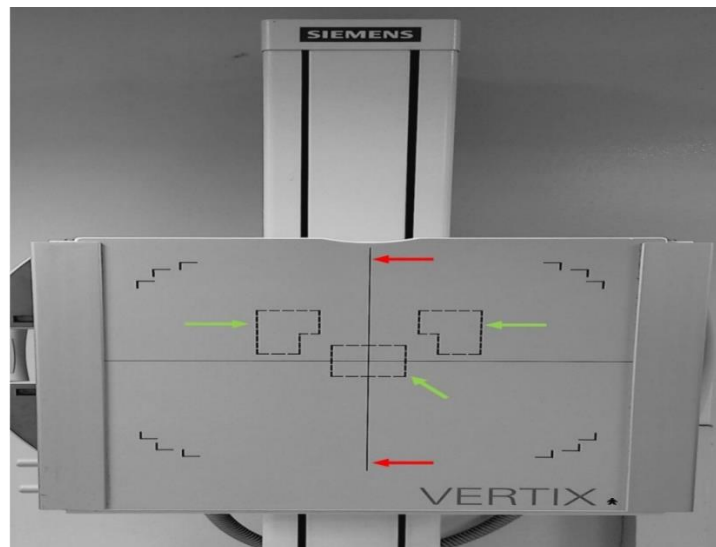


Figure 7: The centralization line (red arrows) and the Automatic Exposure Control (AEC)/Ionization Chambers in (green arrows).

Similar Issues in Other Modalities

In another paper about using a flat couch in MRI scan for radiotherapy planning, it should be more accurate positioning on a flat table can help in delivering radiotherapy treatment [4]. The use of curved tables in CT scanners, are most likely to allow the patients to centralized themselves appropriately. But from a clinical experience, most of the patients throw themselves on the table without centralizing. Even when instructions are given, they still do not centralize themselves. For religious reasons, a male radiographer is not allowed to touch a female patient to centralized her in appropriate way. Touching a female patient (hands, arms, feet, any part) will be considered a form of sexual harassment and against the code of conduct in many Muslim countries. As

well, the dress of the patient will play a role in positioning the patient in a wrong way (i.e., removing the dress is not allowed). Other reasons for making the table curved is to allow patient comfort and the design is done by non-radiology experts (i.e., biomedical engineering).

Conclusion

A flat table with a centralization line can help the patient to adjust his/her-self on the couch for the CT scanner. With a flat table, the fluid level will not move to one direction due to the curvature of the couch, but the patient will remain in a "status of equilibrium" on a flat table.



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