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DIGITAL DOCUMENT FOR ENDOVASCULAR SURGICAL PLANNING FOR AORTIC ANEURYSM

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ABSTRACT: Introduction: Researchers have encountered difficulties in obtaining data related to surgical planning for aortic aneurysms. Currently, the measures used in endovascular treatment planning are not available in full in the patient's medical records, and the description of the parameters used in surgical planning is not included in computed tomography angiography (CTA) reports. **Objective**: The overall objective of this study is to develop a standardized and structured digital document for recording the anatomical parameters necessary for the evaluation and treatment of aortic aneurysms (AA), obtained from the study of preoperative imaging, CT angiography, to be included in the electronic medical record. In addition, to qualify the recording of information on AA parameters necessary for evaluation, follow-up, and therapeutic planning to be attached to the medical record. **Methodology**: The development took place in two stages: initially, a bibliographic survey was conducted to substantiate and characterize the need for the proposal. Then, in collaboration with a vascular surgeon from the institution and a specialized illustrator, digital models representing the anatomy of the four main types of aortic aneurysms were created. The illustrations, drawn by hand, were processed using artificial intelligence for visual enhancement. In addition, the vascular parameters essential for surgical planning, obtained through CT angiography and specific software, for subsequent recording in the document. **Result**: Four digital documents were generated with illustrations of the main AAs: descending thoracic, abdominal, aorto-iliac and thoracoabdominal, with editable fields editable for filling in the dimensions and vascular characteristics according to the patient's preoperative CT angiography, type of endoprosthesis required, as well as a red symbol to mark the exact location of the dilation. **Conclusion**: Based on the structured and organized record in the medical record, it is expected that access to data will become more accessible and transparent, whether for surgical planning, auditing, or as a source for teaching, research, and development.

KEYWORDS: Aortic aneurysm, endovascular procedures, electronic medical records.

INTRODUCTION

The aorta is the main artery in the human body, and aortic aneurysm (AA) consists of a permanent dilation greater than 50% of the normal diameter, resulting from the degeneration of elastic and collagen fibers, increasing the risk of rupture and mortality. Often asymptomatic, AAs are discovered incidentally or due to symptoms such as abdominal pulsation. The prevalence is higher in men and the elderly, reaching up to 20% among siblings of affected patients (SBACV, 2024; CHAIKOF et al, 2018; WANHAINEN et al, 2018).

Endovascular aortic repair (EVAR) has established itself as an alternative to open surgery (OAR), requiring rigorous planning based on CT angiography and measurements using OsiriX® software, which allows for detailed analysis and essential measurements (AMATO; BENITTI, 2011). However, this program is not integrated with the hospital's imaging system and electronic medical records, making standardized records difficult.

Given the scarcity of structured data for endovascular planning, this study proposes a digital document with graphical representation and editable fields for recording aneurysm measurements and anatomical characteristics found on CT angiography, to be incorporated into the electronic medical record. The tool aims to improve healthcare safety, facilitate audits, assist in teaching and research, and standardize documentation for clinical follow-up and therapeutic planning.

OBJECTIVES

General

To develop a standardized and structured digital document for recording the anatomical parameters of aortic aneurysms necessary for evaluation and treatment, obtained from preoperative computed tomography angiography imaging studies, to be included in electronic medical records.

Specific

To qualify the recording of information on aortic aneurysm parameters necessary for evaluation, follow-up, and therapeutic planning to be attached to the medical record.

METHOD

The work was developed in two stages: first, a bibliographic survey was conducted in national and international guidelines, scientific articles, and databases such as PubMed to substantiate the need for the proposal. Next, four digital documents were created, in partnership with an endovascular surgery specialist, containing anatomical models of the main types of aortic aneurysms (descending thoracic, thoracoabdominal, infrarenal abdominal, and aorto-iliac) to be attached to the electronic medical record. These models include editable fields for recording measurements and anatomical characteristics, as well as an adjustable visual marker for identifying the aneurysm. The illustrations were prepared by a specialized professional, digitized, and enhanced using artificial intelligence (ChatGPT – GPT-4 version), in collaboration with the Medical Physics Service.

RESULT

The product was developed in partnership with a vascular surgeon, aiming to address the lack of structured records of preoperative CT angiography analysis in medical records. To make it educational and functional, an illustrator was hired to create representations of the four most prevalent types of aortic aneurysms: descending thoracic (AAT), infrarenal abdominal (AAA), aorto-iliac (AAI), and thoraco-abdominal (AATA), allowing for the indication of location, extent, and characteristics such as calcifications and stenoses. The graphic images were redefined using artificial intelligence and integrated into a digital document with editable fields for patient data, standardized measurements, and anatomical characteristics, including an adjustable marker for aneurysm positioning.

The document includes essential measurements: diameters, lengths, angles, and the presence of calcifications or stenoses. For AATA, it also includes the Crawford classification and dimensions of the visceral arteries. There is space to record the suggested endoprostheses and indicated sizes.

The models of the four types of aneurysms were made available in a shared folder, called VASCULAR, to allow the physician to select, edit, and insert them into the electronic medical record, ensuring integration between analysis, planning, and clinical record. To enable inclusion, the image *upload* functionality was enabled in the scheduling system for the Peripheral Vascular Surgery specialty was enabled.

DISCUSSION

National and international guidelines guide the diagnosis, treatment, and follow-up of AA, with the success of endovascular repair (EVAR) depending on careful planning, advanced technology, and trained teams. Detailed analysis by CT angiography with 3D reconstruction is essential for endoprosthesis selection and surgical strategy definition. Technological advances in devices and software have increased safety and patient eligibility, but their effectiveness depends on the experience of the team.

Complete documentation of the surgical planning stages is essential for safety, traceability, and quality of care, as well as being the basis for research, teaching, and development. The absence of structured records can compromise clinical decisions and limit scientific analysis.

The need was then identified to integrate into the electronic medical record a standardized record of the preoperative analysis performed by the medical team using specialized software such as OsiriX®/Horus. The product developed consists of digital documents with graphic representations of the four types of AA and editable fields for anatomical measurements and relevant characteristics, ensuring standardization in endovascular planning.

The models are available on a shared drive for use by the team, with plans for pilot testing, training of professionals, and development of a tutorial, ensuring continuous guidance for applicability and usefulness for teaching and research.

CONCLUSION

This study developed a standardized digital document with graphic representations of the main types of aortic aneurysms and editable fields for the systematic recording of data from preoperative CT angiography analysis. The tool seeks to optimize endovascular surgical planning, support the choice of endoprosthesis, and integrate diagnosis, therapeutic strategy, and clinical records.

The project was based on national and international guidelines and involved multidisciplinary collaboration. The availability of the document in the electronic medical record makes the information more accessible to the healthcare team and enhances its use for teaching, research, and development.

It is expected that the implementation will promote standardization of records, greater safety and traceability, in addition to contributing to transparency and quality of care. The tool may represent an advance in the systematization of endovascular surgery processes, with the possibility of expansion to other specialties.

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