HIPPOKRATIA 2003, 7, 4: 186-190

ORIGINAL ARTICLE

The role of spiral computed tomography in the diagnosis of inflammatory abdominal aortic aneurysms

Grollios G, [1]Papazoglou K, Tsarouxas K, Kazantzidou Ir , Anastasiou G, Tsinoglou K, Karakozoglou T, Daravigkas D, Terzis Gr, [1]Gerasimidis Th

A΄ Department of Radiology, Hippokrateion Hospital of Thessaloniki
[1]Department of Vascular Surgery, Hippokrateion Hospital of Thessaloniki

The aim of the study was to investigate the contribution of spiral computed tomography with simultaneous bolus injection of contrast agents in the prompt, accurate diagnosis and the postoperative course of inflammatory abdominal aortic aneurysms and their proper treatment. Inflammatory abdominal aortic aneurysms are associated with high morbidity and mortality.

From January 2000 to May 2003, 11 patients with inflammatory abdominal aortic aneurysm of average age 66,7 years (10male and 1 female) were examined by the means of spiral CT and they were submitted to the hospital with the indication of abdominal aortic aneurysm.

They were treated with intralumenar stent placement and reexamined postoperatively.

The radiomorphological findings with the use of spiral CT suggested inflammatory aneurysm, with the development of the characteristic periaortic mass outside the calcified aortic wall, due to perianeurysmal fibrosis. In 2 of the patients this mass produced retroperitoneal fibrosis with strangulation of the ureters and hydronephrosis. Spiral CT is the main diagnostic method in the case of inflammatory abdominal aortic aneurysms. It also demonstrates excellently the prosthesis inside the aneurysm and the retroperitoneal structures.

Hippokratia 2003, 7 (4): 186-190

The term "inflammatory aneurysm" was used for the first time by Walker et al[1] in 1972 in order to describe 19 case reports with a variant of abdominal aortic aneurysms, due to non-infectious etiology, combined with perianeurysmal thickening of the aortic wall and perianeurysmal fibrosis.

The correlation between inflammatory abdominal aortic aneurysm and retroperitoneal fibrosis (which often entraps and strangles the ureters) was described for the first time by James in 1935[1].

Until 1989 the diagnosis of the inflammatory abdominal aortic aneurysm was usually made intraoperatively.

Today, inflammatory aneurysms comprise a variant of abdominal aortic aneurysms and their main characteristic is the existence of perianeurysmal fibrosis and the significant mural thickening (Fig 1) . It is a non- infectious, atherosclerotic aneurysm. Their frequency of appearance rises up to 3-9% among the simple atherosclerotic aneurysms, according to international bibliographic references[4,7]. It has been proven that they are related to high morbidity and mortality.

Immunoallergic hypothesis: a) The atherosclerotic plaque is correlated with some grade of fibrous response, which produces an unknown immune alteration-regional homoallergic response against components (ceroids) of the atherosclerotic plaque.

b) Automatic chronic microruptures may cause formation of haematomas –regional response

c) Lymphatic etiology: infiltration of the periaortic lymph nodes (aortic – periaortic) and consequent lymphatic stasis – regional response.

Prompt diagnosis and treatment provide a better life expectancy. The purpose of our study is to establish the contribution of spiral CT in the diagnosis of the inflammatory abdominal aortic aneurysms

Material and methods

From January 2000 to May 2003 163 patients with a clinical indication of abdominal aortic aneurysm were examined in the Computed Tomography Department. All patients were scanned with spiral CT using a Phillips-Thomoscan 7000. Initially, the scanning of the abdominal aorta was performed without the injection of a contrast agent from the diaphragm to the inguinal area with a 1 cm cut slice. Afterwards, the scanning was repeated with iv contrast injection. We injected 150 ml of a non - ionized contrast agent in all patients using a pump, with a 22 – 25 sec scan delay and an infusion rate of 4ml/sec.

We discovered the existence of an inflammatory abdominal aortic aneurysm in 11 out of 163 patients. 10 of them were male and 1 female, of mean age 66,7 years. The age of the patients ranged between 56 and 89 years.

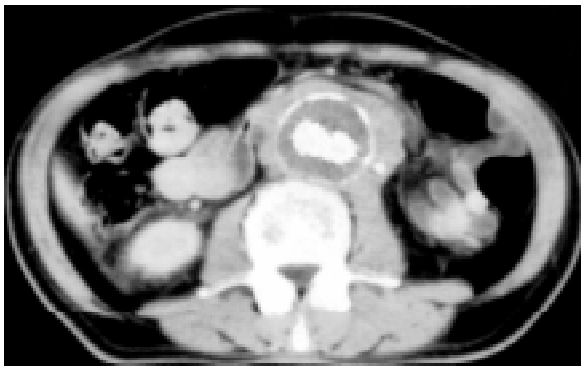

Fig.1: *Double lumen with a stent placement, intramural thrombus with hypodense presentation, distant calcification of the aortic intima, intense contrast enhancement of the perianeurysmal fibrosis.*

Results

Among the 11 patients with inflammatory abdominal aortic aneurysm one was submitted with clinical features of imminent rupture. (Fig 2)

All of our patients were treated in the vascular surgery department with an intralumenar stent placement .Nine patients were postoperatively examined with spiral CT. In all patients the sac of the aneurysm, the orifice of the renal arteries and the kidneys were demonstrated. In 2 patients we found hydronephrosis due to retroperitoneal fibrosis and strangulation of the ureters. Internal drainage was placed in 1 patient. (Fig 5,6)

In 2 of our patients the aneurysm was extended into the ileac arteries. (Fig 7)

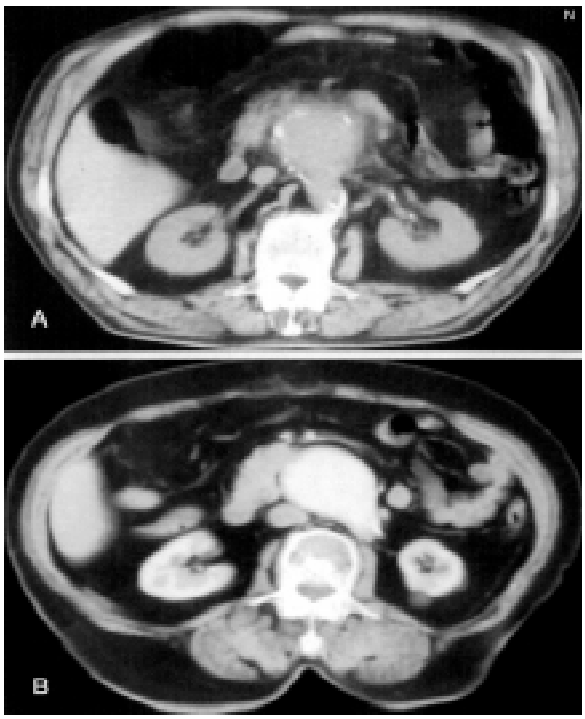

Fig. 2: *Before (A) and after (B) iv contrast agent injection in the case of imminent rupture.*

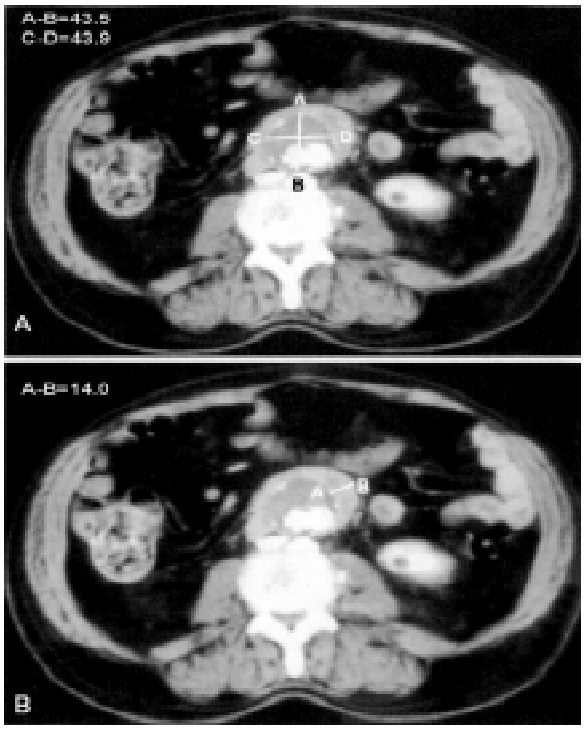

Fig. 3: *Measuring the diameter of the aneurysm (A) and the perianeurysmal fibrosis (B) in a patient with a stent placement after the contrast agent injection.*

The main radiological findings of these inflammatory aneurysms were the following: (Fig 8,9)

a. The residual lumen of the aneurysm, which is promptly depicted after the injection of the contrast agent.

b. The thrombus surrounding the lumen.

c. The calcified wall of the abdominal aorta

d. The periaortic inflammatory mass distant to the calcified abdominal aorta intima. Its main characteristic is that before the intravenous injection of the contrast agent the mass is depicted as hypodense, whereas after the injection it is depicted as hyperdense, strongly contrasting the distant thrombus. The fibrous tissue is amplified according to the degree of the inflammation (percentage of monocytes into the fibrocollagen layer with a varying degree of fibrosis- hyalinosis-lipogranulomatosis)

e. Demonstration of possible leak

Discussion

Inflammatory abdominal aortic aneurysms are very rare[2,3]. The main risk factors in the case of inflammatory abdominal aortic aneurysms are similar to those contributing to atherosclerotic abdominal aortic aneurysms (smoking, male gender, familiar correlation)[4].

Extension of the inflammatory aneurysms into the ileac vessels is found in about 30% of all cases[5]. The transverse diameter of the inflammatory abdominal aor-

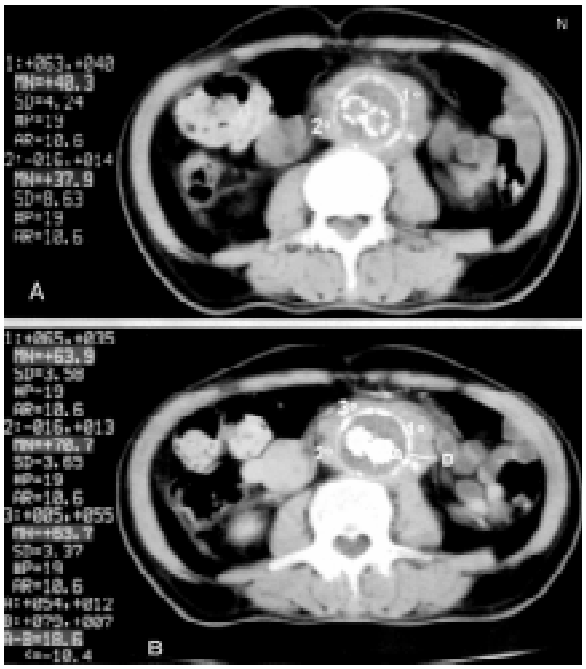

Fig. 4: *Measuring the density of the periaortic fibrosis, which characteristically demonstrates the intense vascularity of the mass. A. without a contrast agent B. after the contrast agent injection*

tic aneurysms is enlarged due to wall thickening and is often found to be more than 7mm. The clinical and histopathological characteristics of inflammatory aneurysms resemble those of retroperitoneal fibrosis, strangulation of the ureters, infiltration of the duodenum and extensive perianeurysmal fibrosis or inflammation[2,9,10].

The clinical symptoms include abdominal pain, lumbar pain, a bulging abdominal mass or symptoms due to ureters strangulation.

Prompt and accurate preoperative diagnosis of inflammatory aneurysms is crucial, because the morphological features of these aneurysms can produce difficulties during the operation.

Fig. 6: *Retroperitoneal fibrosis leading to right hydronephrosis*

In our hospital all inflammatory abdominal aortic aneurysms were treated successfully with intralumenar stent placement. Of course, rupture of inflammatory abdominal aorta aneurysms is less frequent than that of the common atherosclerotic abdominal aortic aneurysms[5,7].

-The diagnosis of inflammatory aneurysms is achieved by the combination of clinical and laboratory findings, whereas the role of spiral CT with intravenous injection of contrast agent is primary.

-The presence of periaortic mass can sometimes create diagnostic problems with the presence of periaortic masses after the rupture of atherosclerotic abdominal aortic aneurysm. The rupture of the aneurysm into the retroperitoneal space can be demonstrated as a hyperdense periaortic mass (due to recent hemorrhage) with vague boundaries, which is not enhanced with the contrast agent. On the contrary, the periaortic mass of the inflammatory abdominal aortic aneurysm is enhanced after the contrast injection and is depicted distant to the calcified thrombus.

Additionally, spiral CT is the most reliable diagnostic method in the postoperative follow-up of the patients because it provides accurate information about the stent, the aorto-ileac axis wall and the existence of possible complications such as leaking, hydronephrosis, clotting, obstruction of the 3rd portion of the duodenum or the

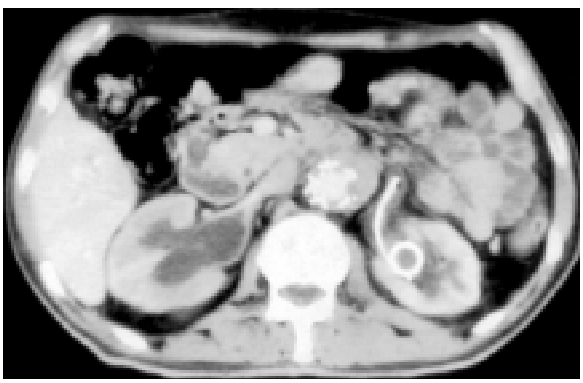

Fig. 5: *Retroperitoneal fibrosis with bilateral hydronephrosis. Placement of an internal drainage into the left kidney*

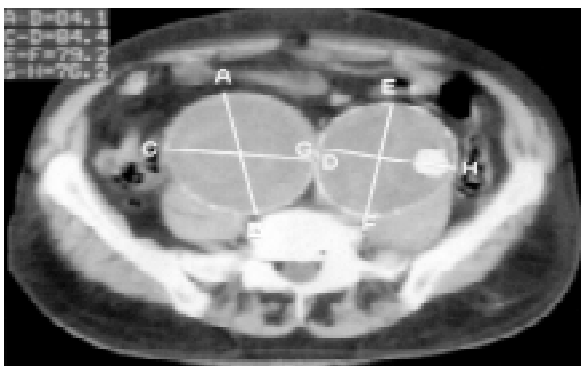

Fig. 7: *Extension of the inflammatory aneurysms into the common ileac arteries. At the right the stent placement is depicted showing good function*

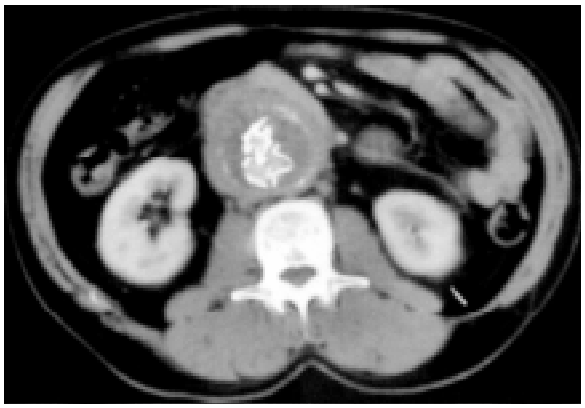

Fig. 8: *Inflammatory aneurysm. Prompt postoperative examination with excellent function*

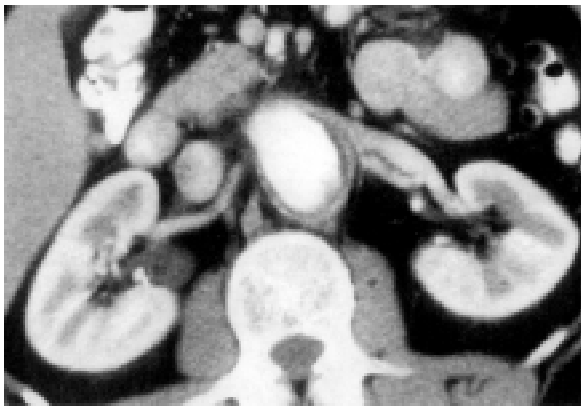

Fig. 9: *Inflammatory aneurysm. Normal renal blood supply and normal renal arteries are demonstrated.*

formation of an aneurysm into the anastomosis[9,10].

Spiral CT provided us with credible information about the proper placement, the integrity, the function of the graft and the presence of periaortic fibrosis of the inflammatory aneurysm into the retroperitoneal space in all of our patients. Recent studies report the use of MRI as a sensitive method into the diagnosis of inflammatory abdominal aortic aneurysms, besides spiral CT. We believe that there are limitations in the usage of MRI[7,11], such as that it cannot be used in the case of a emergency due to the extended duration of this exam and the difficulty of following up these patients. Besides, lack of demonstration of the intramural calcifications is a drawback.

Ultrasound and digital angiography have a limited role in the demonstration of the inflammatory abdominal aortic aneurysms[7].

- Scanning with spiral CT is the main diagnostic method in the case of inflammatory abdominal aortic aneurysms. At the same time, it demonstrates excellently the prosthesis inside the aneurysm, a possible leak and the retroperitoneal structures.

- Most inflammatory aneurysms are successfully treated with an intralumen graft placement.

- After the placement of the intralumen graft, while the mean aortic volume is decreasing due to reduction in blood supply, the perianeurysmal fibrosis is not altered.

- It has been proven that the fibrous mass is slightly reduced after the treatment with steroids[6,8,10].

In conclusion spiral CT is a safe and reliable method, contributing in the diagnosis of inflammatory abdominal aortic aneurysms. It is a non invasive diagnostic technique, measuring with precision the dimensions of the aneurysm, the mural thrombus and the perianeurysmal fibrosis and providing results that comply with the surgical findings.

Περίληψη

Γρόλλιος Γ, Παπάζογλου Κ, Τσαρουχάς Κ, Καζαντζίδου Ειρ, Αναστασίου Γ, Τσίνογλου Κ, Καρακόζογλου Θ, Δαραβίγκας Δ, Τερζής Γρ, Γερασιμίδης Θ. **Ο ρόλος της Spiral CT στη διάγνωση των φλεγμονωδών ανευρυσμάτων της κοιλιακής αορτής.**

Ιπποκράτεια 2003, 7 (4): 186-190

Σκοπός αυτής της μελέτης είναι η διερεύνηση της αξιοπιστίας της Spiral CT στη διάγνωση των φλεγμονωδών ανευρυσμάτων της κοιλιακής αορτής, τα οποία σχετίζονται με υψηλά ποσοστά θνησιμότητας και θνητότητας. Έντεκα ασθενείς με φλεγμονώδες ανεύρυσμα κοιλιακής αορτής εξετάσθηκαν με spiral CT. 10 ασθενείς ήταν άντρες και 1 γυναίκα , με μέσο όρο ηλικίας 66,7 έτη. Οι ασθενείς αυτοί υποβλήθηκαν σε χειρουργική επέμβαση και 9 επανεξετάστηκαν μετά την επέμβαση με spiral CT.

Η αξονική τομογραφία αποκάλυψε παχυμένο, συχνά επασβεστωμένο αορτικό τοίχωμα, καθώς και μια παραορτική μάζα φλεγμονώδη ιστού. Τα φλεγμονώδη ανευρύσματα της κοιλιακής αορτής είναι σπάνια. Η spiral CT τοποθετεί τη διάγνωση προεγχειρητικά και αποδεικνύεται αρκετά αξιόπιστη τεχνική στη μετεγχειρητική παρακολούθηση των ασθενών παρέχοντας λεπτομερείς πληροφορίες για το μόσχευμα, τα αορτολαγόνια τοιχώματα και τις οπισθοπεριτοναϊκές δομές.

References

1. Moosa Haus, Peitzman An, Steed D, et al. Inflammatory aneurysms of abdominal aorta. Arch Surg 1989;124:673-675
2. Leseche Guy, Schaetz A et al. Diagnosis and Management of 17 consecutive patients with inflammatory abdominal aorta aneurysms. The American Journal of Surgery 1992;164:39-44
3. Rieber A, Kauffman G, Allenberg Jr: The radiological diagnosis of inflammatory aneurysms. Radiology 1989; 29: 620-624
4. Sterpetti An, Hunter W, Feldhaus R et al. Inflammatory aneurysms of the abdominal aorta:Incidence, pathologic and etiologic considerations. J. Vasc surg. 1989; 9 : 643-650
5. Arrive L, Correas J, Leseche Guy, Ghebonti Lofti, Tubiana J. Inflammatory aneurysms of the abdominal aorta: CT findings. AJR 1995; 165: 1481-1484
6. Curci J: Modes of presentation and management of inflammatory aneurysms of the abdominal aorta. J Am Coll Surg. 1994; 178: 573-580
7. Grava M., Loukas Th., Pomoni M., Papatheodorou A,

Batakis N: Inflammatory abdominal aortic aneurysms: a study with CT. Hellenic Radiology 2001; 32: 434-440
8. Hayashi H., Kumazaki T. Case report. Inflammatory abdominal aortic aneurysm – dynamic Gd – DTPA enhanced magnetic. Br J Radiology 1995; 68: 321-323
9. Todd GJ, De Rose JJ: Retroperitoneal approach for repair of inflammatory aortic aneurysms. Ann Vasc Surg 1995; 9: 525 – 534
10. Gigoni R, Borashi P, Carei F: Inflammatory aortic aneurysms of the abdominal aorta. Assessment of the postoperative course. Radiol Med. (Torino). 1996; 92: 213-217
11. Wallis F, Roditi G, Redpath T, Weir J: Inflammatory abdominal aortic aneurysms diagnosis with gadolinium enhanced T1 –weighted imaging. Clin Radio 2000; 55: 136-139.

Corresponding author: Grollios G - 94, Ag. Dimitriou str., 54631 Thessaloniki, Greece
email: ggrollios@hol.gr
Υπεύθυνος αλληλογραφίας: Γ. Γρόλλιος, Αγίου Δημητρίου 94 54631 Θεσσαλονίκη
email: ggrollios@hol.gr