

RESEARCH ARTICLE

CONTRIBUTION OF CT ANGIOS IN THE DIAGNOSIS OF SUBRENAL ABDOMINAL AORTA ANEURYSM AT THE "LUXEMBOURG" MOTHER-CHILD HOSPITAL CENTER

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Abstract

Objective: Our study aimed to study the value of CT angiography in the diagnosis of subrenal abdominal aortic aneurysm at the Mother-Child University Hospital Center "Le Luxembourg"

Methodology : This was a retrospective, descriptive and analytical study carried out over a period of three years (from January 1, 2019 to December 31, 2021) in the radiology departments of CHME Mère et Enfant "Le Luxembourg". It concerned all patients who had an angio-CT scan in the radiology department of the CHU-ME "Le Luxembourg" in whom a subrenal abdominal aortic aneurysm was diagnosed. Excluded from our study were aneurysms of the thoracic aorta and vessels of the neck as well as the limbs.

Results : We retained 22 cases of AAA meeting our inclusion criteria. The male gender was the majority (66.7%) with a sex ratio (M/F) of 1.5. The most represented age group was those over 50 with 66.7%. Hypertension was the most represented risk factor with a rate of 33.3%. Abdominal pain was the most frequent functional sign with 77.77%. More than 66.7% of our patients had an abdominal mass. The majority of our patients had a saccular type of aneurysm (67%). The average anteroposterior diameter of the AAA was 56 mm. The average transverse diameter was 63 mm. The average length of the aneurysm was 77 mm. All our patients had heterogeneous aneurysm contents with mural thrombus. The edge of the aneurysm was irregular with loss of parallelism in all our patients. More than half (55.6%) of our patients had aortic calcifications. Only one of our patients presented with fissure syndrome. 33.3% of our patients had the sign of extension to the renal arteries. The majority of our patients had visceral branch patency with a rate of 88.9%. The biological assessment was dominated by anemia with a rate of 44.4%. The echocardium was pathological in 11.1%. Conclusion: Abdominal aortic aneurysms are becoming more and

conclusion: Abdominal aortic aneurysms are becoming more and more common. More than 90% of abdominal aortic aneurysms develop at the expense of the infrarenal aorta. The most common vascular risk factors are hypertension and smoking. Aneurysms are generally asymptomatic, making their clinical diagnosis difficult. CT angiography remains the complementary examination of choice in the diagnosis of thoraco-abdominal arterial lesions.

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Introduction:-

An aneurysm is a localized permanent dilatation due to loss of parallelism of the vessel walls and an increase in diameter greater than 50% of the diameter of the adjacent non-aneurysmal vessel segment.

In France according to the High Authority of Health (HAS), abdominal aortic aneurysm (AAA) is a permanent dilatation of the abdominal aorta (anteroposterior diameter > 30 mm in its subrenal location)

At the level of the infrarenal abdominal aorta, the preferred site of the disease, the aneurysm is retained from a diameter of 30 mm in numerous epidemiological studies.

The number of AAAs operated on per year increased by 29% between 2006 and 2010. More than 90% of abdominal aortic aneurysms develop at the expense of the infrarenal aorta. This normal aortic diameter is subject to variations related to age, body surface area and vascular risk factors such as smoking and diastolic blood pressure.

The incidence of diagnosed and operated AAAs in France was between 6,000 and 7,000 AAAs/year in 2009–2010.

The aneurysm can be fusiform or saccular, the fusiform shape being the most common. The etiologies of abdominal aortic aneurysms are, in order of frequency, atheroma, infections, inflammatory arteritis, elastic tissue pathologies and aortic dissection. Post-traumatic or iatrogenic pseudoaneurysmal lesions are associated with this.

The decision to operate on an unruptured AAA is based on two criteria, an aneurysm sac diameter >50 mm and/or AAA growth >10 mm/year. Curative treatment of AAAs with a diameter \leq 50 mm showed no benefit in terms of specific mortality compared to therapeutic abstention.

In 1990, the spiral or helical technique appeared which revolutionized non-invasive vascular imaging through its volume acquisition mode and its reconstructions compared to sequential CT. Alongside aortic applications, new indications have emerged such as the screening of abdominal aortic aneurysms. In addition, screening sensitivity has increased and quantification of lesions in diameter and length has been improved. Helical CT angiography is beginning to replace angiography in certain indications. In aortic pathology, CT scans play a key role both in the detection and assessment of abdominal aortic aneurysms.

In Mali, few studies have been carried out on the contributions of CT angiography in the management of infrarenal abdominal aortic aneurysms. Surgery of the subrenal abdominal aorta is a high-risk surgery which is carried out on a population of patients very frequently suffering from ischemic heart disease and COPD due to a common risk factor for these two diseases with the pathology. aortic. Its main indications are aorto-iliac aneurysmal and occlusive pathology. With the advent of cardiovascular surgery in September 2018 at CHME Mère et Enfant "Le Luxembourg" we began to operate on subrenal AAAs with the contribution of multimodal imaging available in Mali for more than a decade.

This is why we considered it appropriate to carry out this retrospective study with the main objective of studying the CT angiography characteristics of the management of infrarenal abdominal aortic aneurysms CHME Mother and Child "Luxembourg".

Result:-

The Overall Results:

We retained nine (9)cases of AAA operated on out of 22 cases meeting our inclusion criteria.

1-SEX



Figure 1:- Distribution of patients by gender : In our study, the male gender was in the majority with 66.7% with a sex ratio (M/F) of 1.5.

2-Age Group



Figure 2:- Distribution of patients according to age group : In our study, the most represented age group was those over 50 with 66.7%.

3- Risk Factors And History



Figure 3:- Distribution of patients according to risk factors and history : Hypertension was the most represented risk factor in our study with a rate of 33.3%.

4-	Table I:-	Distribution	Of Patients	According	То	Functional 3	Signs.
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FUNCTIONAL SIGNS	NUMBER (n)	PERCENTAGE %
ABDOMINAL PAIN	7	77,77
INTERMITTENT CLAUDICATION	1	11,1
OTHER SIGNS	1	11,1
TOTAL	9	100

Abdominal pain was the most represented with 77.77%.

5- Physical Signs :



PHYSICAL SIGNS

Figure 4:- Distribution of patients according to physical signs.

DEBAKEY's sign: The possibility of passing the edge of the hand between the costal margin and the upper pole of the aneurysm indicates the subrenal location of the latter More than 66.7% of our patients had an abdominal mass.

6- Distribution of patients according to the angio-scanographic semiology of arterial lesions.



Figure 5:- Distribution of patients according to aneurysm typeThe majority of our patients had a saccular type of aneurysm.

7- Table II:- Distribution of Patients According to the Antero-Posterior Diameter of the Aneurysm	ı.
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SIZE (ANTERIOR-POSTERIOR DIAMETER)	NUMBER	PERCENTAGE %
40-50 mm	2	22,2
50-60 mm	2	22,2
60-80 mm	5	55,6
TOTAL	9	100

The average anteroposterior diameter was 56 mm with extremes of 40 mm and 80 mm.

8- Table III:- Distribution of Patients According to Transverse Diameter.

Size (ANTERIOR-POSTERIOR DIAMETER)	NUMBER	PERCENTAGE %
40-50 mm	2	22,2
50-60 mm	1	11,1
60-80 mm	6	66,7
TOTAL	9	100

The average transverse diameter was 63 mm with extremes of 40 mm and 65 mm.

9- Distribution Of Patients According To Aneurysm Lenght



ANEURYSM LENGTH

Figure 6:- Distribution of patients according to aneurysm length. The average length of the aneurysm was 77 mm with extremes of 35 mm and 140 mm.

10-	Tables IV:-	Distribution of Patients According To the Contents of the Aneurysm.
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CONTENTS OF THE ANEURYSM	NUMBER	PERCENTAGE %
HETEROGENEOUS WITH THROMBUS	9	100
WALL		
HOMOGENEOUS WITHOUT MURAL	0	0
THROMBUS		
TOTAL	9	100

All our patients had heterogeneous aneurysm contents with mural thrombus.

11- Table V:- Distribution of Patients According to the Edge of the Aneur	ysm.
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ANEURYSM EDGE	NUMBER	PERCENTAGE %
IRREGULARS WITH LOSS OF	9	100
PARALLELISM		
REGULAR WITH LOSS OF PARALLELISM	0	0
TOTAL	9	100

The edge of the aneurysm was irregular with loss of parallelism in all our patients.

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CALCIFICATIONS	NUMBER	PERCENTAGE %
OUI	5	55,6
NON	4	44,4
TOTAL	9	100

More than half (55.6%) of our patients had aortic calcifications.

13- Tables VII:- Distribution of Patients According to Fissure Syndrome.

SYNDROME FISSURAIRE	NUMBER	PERCENTAGE %
OUI	1	11,1
NON	8	88,9

TOTAL	9	100
Only one of our notion to presented with figure our drome		

Only one of our patients presented with fissure syndrome.

EXTENSION	NUMBER	PERCENTAGE %
OUI	3	33,3
NON	6	66,7
TOTAL	9	100

In our study 33.3% of our patients had the sign of extension to the renal arteries.

15- Table IX:- Distribution of Patients According to the Permeability of the Visceral Branches.

PERMEABILITY OF VISCERAL BRANCHES	NUMBER	PERCENTAGE %
YES	8	88,9
NO	1	11,1
TOTAL	9	100

The majority of our patients had visceral branch patency with a rate of 88.9%.

16-Distribution of Patients According to Heart Echography



HEART ECHOGRAPHY

Figure 7:- Distribution of patients according to heart echo.

The majority of our patients had a normal echocardiogram with a good LVEF without ischemic heart disease. **Table X:-** Distribution of Patients According to Biological Assessment.

BIOLOGY REPORT	NUMBER	PERCENTAGE %
ANEMIA	4	44,4
SYPHILIS	0	0
TUBERCULOSIS	0	0
NO PARTICULARITY	5	55,5
TOTAL	9	100

The biological assessment was dominated by anemia with a rate of 44.4%.

IV Comments and Discussions:-

We conducted a retrospective study, the data collection of which was carried out in the cardiovascular surgery and radiology departments at the CHME Mère et Enfant "Le Luxembourg"

During this period, we collected 22 patients suffering from an aortic aneurysm, including 9 cases operated for subrenal AAA with good imaging.

Socio-Demographic Characteristics

Age :

The average age of our series was 60 years, which is consistent with literature data. Abdominal aortic aneurysm is classically known as a disease occurring from the sixth decade onwards with an average age between 60 and 70 years in the series by Abdoulaye Ndoye DIOP and Cornet et al [3, 4].

It has been shown that AAA is rare before the age of 45 and is most often associated with a disease, such as Marfan syndrome or Ehlers Danlos disease in type IV in the series by Emmeric J [5]. On the other hand, we found 33.3% among young subjects, which agrees with Cornet in Africa without Ehlers Danlos diseases.

Gender:

The male predominance classically described by Hannawa et al[6] was found in our series with 66% of cases. The studies carried out by TOUANI TC [7] and Papa Adama Dieng [8] which respectively noted a male predominance of 74.4% and 80%, unlike AZEBAZE AP [9] which found a female predominance of (60%).

Antecedents

Hypertension was the most represented antecedent, i.e. 33.3%; this result is comparable to that of TOUANI TC [7] with 37.8% of hypertensive patients.

Cardiovascular risk factors such as hypertension, tobacco, alcoholism are found in all Western and American studies, which is consistent with our series. They constitute a poor prognosis factor.

Clinical

Circumstance of Discovery

Increasingly in Western countries, the aneurysm is often asymptomatic and is discovered during an abdominal ultrasound performed for another pathology, or as part of systematic screening. Screening justified in patients with another manifestation of atherosclerosis: coronary artery disease, arteritis of the lower limbs, hypertension or when an aneurysm has been discovered in the family or in the same subject according to the Becquemin J. P. Ernenwein D series [10].

Functional signs

In our series, pain was the main reason for consultation. In the studies of Roy J and D. BOULATE [11, 12] the aneurysm was discovered incidentally in the majority of our patients.

In our study, abdominal pain and abdominal mass represented the most dominant functional signs as by other authors [8].

Physical signs [3, 4].

The subrenal location of the aneurysm was suspected in all our patients by the De Bakey sign (The possibility of passing the edge of the hand between the costal margin and the upper pole of the aneurysm indicates the subrenal location of the aneurysm. the latter) which was present in cases of abdominal mass. Screening is unfortunately not systematic in subjects at risk in Mali, ultrasound and CT angiography not being accessible to all patients. Currently their average costs in public hospitals are respectively 15,000 CFA francs and 80,000 CFA francs with the contrast product.

The clinic always remains essential and is sometimes sufficient in our working conditions, but it has certain limits. Indeed, small aneurysms require monitoring, which may go unnoticed during the physical examination.

The Result of the Ct Angiogram:

In our study, all our patients had subrenal AAA. The majority of our patients had a type of saccular aneurysm, i.e. 66.7%, as in the series by SALIOU C, JEGO P, CORMIER JM [13]. The edges of the aneurysm were irregular with loss of parallelism in all our patients. All our patients had heterogeneous aneurysm contents with mural thrombus. Atherothrombotic material represented the most frequent CT angiographic lesion. This presence in the aneurysm is

classic, it constitutes the main etiology of the aneurysm in 80% of cases as in the series by Mialhe C et al [14]. More than half, 55.6% of our patients had calcifications of the aortic wall. The average anteroposterior diameter was 56 mm with extremes of 40 mm and 80 mm. The average transverse diameter was 63 mm with extremes of 40 mm and 65 mm. Abdoulaye NDOYE DIOP [3] found an average transverse diameter of 62 mm, which agrees with our series. The average length of the aneurysm was was 77 mm with extremes of 35 mm and 140 mm. The average diameter of the proximal neck was 16.5 mm and the average diameter of the distal neck was 18 mm. Only one of our patients presented the fissure syndrome.

Extension of the aneurysm was absent in 66.7% of our patients and 88.9% of our patients presented patency of the visceral branches. These results were comparable to studies conducted by Abdoulaye NDOYE DIOP [3].

Conclusion:-

Abdominal aortic aneurysms are increasingly described in our country. The number of AAAs operated per year increased by 29% between 2006 and 2010 [4]. More than 90% of abdominal aortic aneurysms develop at the expense of the infrarenal aorta. This normal aortic diameter is subject to variations linked to age, body surface area and vascular risk factors such as smoking and diastolic blood pressure [2].

Cardiovascular pathologies remain the predominant risk factors. Aneurysms are generally asymptomatic, making their clinical diagnosis difficult. The appearance of signs most often reflects complications which remain formidable. However, a better prognosis requires early diagnosis. CT angiography remains the complementary examination of choice in the diagnosis of thoraco-abdominal arterial lesions. Its systematic introduction in the assessment of abdominal aneurysms as well as the development of vascular surgery will probably contribute to the reduction of mortality from these lesions.

Iconography Some Pre-Operative Scan Angi Images From Our Study:



Figure 8:- Angioscanner abdominal en coupe coronale en mode MIP objectivant une dilatation anévrismale fusiforme de l'aorte abdominale sous rénale de contours irréguliers avec perte du parallélisme étendue à la bifurcation iliaque associée à un thrombus pariétal, faisant effet de masse sur les structures de voisinage, sans épanchement liquidien péri aortique ni de signe d'extravasation du produit de contraste iodé.





Figure 9:- Abdominal CT angiogram in coronal section in MIP mode showing a fusiform aneurysmal dilatation of the subrenal abdominal aorta with irregular contours with loss of parallelism extended to the iliac bifurcation associated with a parietal thrombus, causing mass effect on neighboring structures, without peri-aortic fluid effusion or signs of extravasation of the iodinated contrast product.



Figure 10:- Angioscanner abdominal en coupe coronale en mode MIP objectivant une dilatation anévrismale fusiforme de l'aorte abdominale sous rénale de contours irréguliers avec perte du parallélisme étendue à la bifurcation iliaque associée à un thrombus pariétal, faisant effet de masse sur les structures de voisinage, sans épanchement liquidien péri aortique ni de signe d'extravasation du produit de contraste iodé.

LEFT



Figure 11:- Abdominal CT angiogram in coronal section in MIP mode showing saccular aneurysmal dilatation of the subrenal abdominal aorta with irregular contours with loss of parallelism associated with a parietal thrombus, without sign of extension to the iliac branches and causing a mass effect on neighboring structures, without periaortic fluid effusion or sign of extravasation of the iodinated contrast product.





Figure 12:- Abdominal CT angiography in axial section in MIP mode showing saccular type aneurysmal dilatation of the subrenal abdominal aorta with irregular contours with loss of parallelism associated with a parietal thrombus, without sign of extension to the iliac branches and having the effect of mass on neighboring structures, without periaortic fluid effusion or sign of extravasation of the iodinated contrast product.



Figure 13:- Abdominal CT angiogram in coronal section in MIP mode showing an hourglass aneurysmal dilatation of the subrenal abdominal aorta with irregular contours with loss of parallelism associated with a parietal thrombus, without signs of extension to the iliac branches and causing a mass effect on neighboring structures, without periaortic fluid effusion or sign of extravasation of the iodinated contrast product.

Some Post-Operative Scan Angi Images From Our Study:





Figure 14:- Post-operative abdominal CT angiogram with 3D reconstruction showing placement of aorto-aortic type stent, no endoleak.





LEFT

Figure 15:- Post-operative abdominal CT angiogram in axial section in MIP mode showing the abdominal aorta of normal diameter, regular contours, no sign of the iodinated contrast product.



Figure 16:- Post-operative abdominal CT angiogram in sagittal section in MIP mode showing the abdominal aorta of normal diameter with placement of an aorto-aortic type stent, no endoleak.



Figure 17:- Post-operative abdominal CT angiogram in volume rendering of the abdominal aorta showing placement of an aorto-biliac type stent, no endoleak.

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