

Editorial

## Comments on the ESC Guidelines on the Diagnosis and Treatment of Peripheral Artery Diseases. A Report of the Task Force of the Clinical Practice Guidelines Committee of the Spanish Society of Cardiology

Comentarios a la guía de práctica clínica de la ESC sobre diagnóstico y tratamiento de las enfermedades arteriales periféricas. Un informe del Grupo de Trabajo del Comité de Guías de Práctica Clínica de la Sociedad Española de Cardiología

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The European Society of Cardiology (ESC) has released its first guidelines for the diagnosis and treatment of peripheral artery disease (PAD)<sup>1,2</sup>, excluding aortic disease. This editorial provides comments on this guideline, based on the recently established criteria of the Spanish Society of Cardiology (SEC).<sup>3</sup>

Atherosclerosis is a pathological process that affects the entire vascular system, although it predominantly manifests in specific organs. The risk factors for this condition are common, and the primary and secondary prevention measures are useful for the various vascular areas. This requires that we not only diagnose and treat the primary disease, but also explore the rest of the vascular system. This, then, is an important guideline for cardiologists, since it addresses the need to understand and analyze coronary patients using a global approach that goes beyond the cardiac disease.

### METHODOLOGY

Several professionals in the Spanish scientific societies of Nephrology, Neurology, Radiology (Angioradiology and Neuroradiology), and Vascular Surgery were invited to participate in specific analysis of the different vascular areas. The SEC was represented by the sections on clinical cardiology and hemodynamics and on interventional cardiology. This document has been written with the contributions received from these groups, and the final content was approved by all participants. Comments were requested on the following 5 aspects: *a)* the timeliness of the guideline; *b)* methodology; *c)* positive aspects; *d)* debatable aspects, and *e)* aspects

on which further comments are needed. This schematic was applied for each of the vascular areas analyzed.

### GENERAL ASPECTS

#### Epidemiology

##### *Debatable Aspects*

Prevalence data are only provided for Sweden and Germany. However, the prevalence studies from Spain offer lower values than those published in the guidelines. In studies performed in our area using the ankle-brachial index (ABI), we have detected a prevalence of PAD in the lower extremities (defined as a ABI $\leq$ 0.9) of 4.5% to 8%.<sup>4-6</sup> This value increases to 27.7% in patients with metabolic syndromes,<sup>7</sup> 40.5% in patients that have suffered a stroke,<sup>8</sup> and 39.8% in patients during the acute phase of acute coronary syndrome.<sup>9</sup> Also, in Spain the global incidence of peripheral artery disease (PAD) in the lower extremities is 1.9% in patients without previous cardiovascular disease and aged 35 to 84 years at 10 years follow-up.<sup>10</sup>

The guidelines offer very little in terms of prognostic value, other than that the presence of disease in one area increases the risk of symptomatic or asymptomatic disease in another. The presence of PAD in the lower limbs is an important risk factor both for mortality and for the appearance of various cardiovascular complications.<sup>11</sup> Spanish studies performed in diabetics and patients with acute coronary syndrome also suggest that PAD in the legs is a predictor for mortality and cardiovascular events.<sup>12-14</sup>

#### Risk Factors

##### *Positive Aspects*

The guidelines provide adequate description of the principal risk factors associated with the appearance of PAD. They offer a good

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summary and update of the primary risk factors: tobacco, diabetes, arterial hypertension, hypercholesterolemia, and others.

## Diagnosis

### Debatable Aspects

In general, the various diagnostic techniques are discussed only superficially, and other sections are referenced for more information. In the case of computed tomography (CT) and magnetic resonance (MRI), the information is provided in an appendix.

## Treatment, General Regulations

### Debatable Aspects

The recommendations for the control of arterial hypertension are based on the ESC guidelines for this condition. With respect to hypercholesterolemia, the recommendations made for the treatment with statins (IA) coincide exactly with those published this year in the ESC dyslipidemia guidelines. In the recently published American guidelines for PAD,<sup>15</sup> the recommendations for discontinuing tobacco use are class IA, instead of IB as in the European guidelines.

With regard to antiplatelet treatment, the American guidelines also include more detailed recommendations. Antiplatelet treatment is indicated with class IA evidence instead of the IC evidence in European guidelines. The objective with this treatment is to reduce the risk of infarction, stroke, or vascular death, although only in patients with symptomatic PAD of the lower limbs. Both aspirin and clopidogrel have IB recommendations for this same indication, and clopidogrel is the alternative to aspirin. In patients with asymptomatic PAD (ABI $\leq$ 0.9), the indication for antiplatelet treatment has a class IIa recommendation, with level C evidence. The European guidelines do not make this distinction between symptomatic and asymptomatic patients, which is a very relevant issue, since the majority of PAD patients are asymptomatic.

Other class IIb indications in the American guidelines include antiplatelet treatment in asymptomatic patients with borderline ABI (0.91-0.99) or the combination of aspirin and clopidogrel for patients with symptomatic PAD. Another discrepancy with American guidelines is the level of evidence provided for the use of beta blockers. Both guidelines affirm that this type of treatment is safe in PAD patients, but this recommendation is class IA in American guidelines and IIa B in the European guidelines.

Finally, in the treatment of diabetes, a target value of HbA<sub>1c</sub> $\leq$ 6.5% (IC) is established, without providing any bibliographic references to support this recommendation. The ADA 2011, American PAD, and TASC II guidelines<sup>15-17</sup> all set the target value for controlling glycemia at HbA<sub>1c</sub> $<$ 7%.

## EXTRACRANIAL CAROTID ARTERY DISEASE

The most positive aspect of this section is its conciseness. The guidelines are updated and reference the most recent studies carried out in carotid artery revascularization.

## Definitions

### Positive Aspects

The document highlights the causal relationship between obstructive disease (normally atherosclerotic) of the internal carotid artery and the risk of ictus and transient ischemic accident (TIA), both in general and stratified according to the severity of stenosis. The clinical impact of ictus in our society is also commented on as the

third leading cause of death and first cause of medical dependence. Two definitions are provided: symptomatic carotid artery disease and determination of the severity of carotid artery disease using NASCET criteria (greater detail is given in the appendix).

## Diagnosis

### Positive Aspects

In the diagnosis of extracranial carotid artery disease (ECAD), the document distinguishes between clinical evaluation and imaging techniques. Two points are emphasized: the need for a neurologist to evaluate the symptoms derived from the carotid artery, and the presence of symptoms and level of obstruction as the two basic criteria indicating carotid revascularization. With respect to imaging techniques, the guideline mentions that imaging tests should not focus exclusively on the internal carotid artery, but also the adjacent structures (arch, trunks, intracranial collateral circulation, status of the cerebral parenchyma, etc.)

Analyzing the advantages and limitations of each imaging technique, the guideline continues to highlight duplex ultrasound of the carotid as the primary method for detecting and staging the level of carotid artery disease, although this test only assesses the cervical area. On the other hand, MRI and CT scans can provide for a reliable reconstruction of the carotid lesions (although with a tendency to overestimate severity) and assessment of adjacent anatomical structures, an unquestionable advantage in this process.

### Debatable Aspects

Although the guideline makes reference to the priority that must be given to imaging techniques, it does not mention that patients with TIA should be carefully examined as early as possible when their physical and psychic conditions allow it, since the risk of ictus is high. This risk can reach 20% in the first month after TIA, and is especially high in the first 72 hours.

## Types of Treatment

### Positive Aspects

The treatment of ECAD can be medical, surgical, or endovascular (carotid artery stent [CAS]).

Antithrombotic and lipid-lowering drugs are given great importance: all patients with carotid artery disease should receive low doses of aspirin, regardless of symptoms. Also, high doses of atorvastatin (80 mg/day) reduce the rate of cardiovascular events (ictus and major coronary events), regardless of baseline cholesterol values.

As regards revascularization, the two different techniques are discussed: endarterectomy and endovascular treatment (CAS). The guidelines clearly establish the clinical benefits of endarterectomy that have been documented for the last 20 years by the NASCET and ACAS studies in symptomatic and asymptomatic patients, respectively (the technical aspects of this surgery are described in the appendix).

## Experience of the Operator in Carotid Artery Stenting. Distal Protection Systems

### Debatable Aspects

In endovascular treatment, perioperative safety and morbidity/mortality rates depend on the operator, and the long-term efficacy depends on the technique used. No long-term trial published to date has observed differences between the two revascularization techniques,

although there is a difference in periprocedural morbidity and mortality rates. Rather than a certain number of available procedures, we should use criteria that evaluate the skills and experience gained before allowing a specialist to perform endovascular treatment.

There is no consensus regarding the clinical benefit of protective devices, given the nature of the trials that have been performed (small sample size, optional use, etc.)

## Management of Carotid Artery Disease

### Positive Aspects

The management of symptomatic and asymptomatic patients with ECAD is clearly described in the guideline, including a figure and two tables. In symptomatic stenoses, treatment must be given as early as possible within the first 2 weeks. Recommendations given for this subject have class I status and level B evidence. The American Heart Association (AHA) also recommends early treatment (class IIa, level B evidence) in their latest indications. A carotid stent can be considered as an alternative to surgery in high-volume centers and a demonstrated morbidity/mortality rate <6%. In patients with a high surgical risk, the recommendations for a carotid stent are class IIa and level B.

### Debatable Aspects

The recommendations for asymptomatic stenoses are IIa A for carotid endarterectomy and IIb B for stenting. These recommendations are the same as those of the AHA. However, the treatment of an asymptomatic stenosis (whether by surgery or endovascular procedure) is derived from the documentation of the stenosis using imaging techniques, and not through an evaluation of symptoms.

Additionally, the guidelines do not establish specific indications for the treatment of asymptomatic stenoses. In general, an intervention is recommended in the following high-risk situations: *a*) stenosis (>80%) developing in successive follow-up examinations; *b*) asymptomatic stenosis >80% with contralateral occlusion; *c*) clearly diminished or exhausted cerebral vasoreactivity; *d*) detection of embolism in a Doppler scan of the middle cerebral artery homolateral to the stenosis; *e*) silent ischemic lesions in CT and MRI scans, and *f*) patients that are to undergo cardiac surgery.

## Aspects in Which the Guidelines Are Lacking

### Epidemiology

Data from the IBERICTUS study<sup>18</sup> have shown that the incidence of cerebrovascular disease in the Spanish population older than 17 years was 166.9/100 000 inhabitants/year for ictus, and 36.7/100 000 inhabitants per year for TIA. The prevalence of ictus in our area is 6%-7% in people older than 65 years, and cerebrovascular diseases are the second leading cause of death overall, and first in women.

### Clinical Evaluation and Diagnosis Using Imaging Techniques

1. *Carotid artery disease as a marker for atherosclerotic disease in other areas.* Significant coronary lesions are present in 40% of patients that have suffered ictus, and there is an association between obstructive carotid artery disease and PAD. There are no clear recommendations for evaluating the presence of asymptomatic coronary disease in patients with ictus, especially due to large vessel disease (carotid or vertebral artery disease). In these patients, noninvasive tests should be performed to detect myocardial ischemia.<sup>19</sup>

2. *The importance of an adequate approach to patients with TIA.* TIA is an important predictor of stroke, and risk is greatest during the first week. As such, carotid revascularization is important in the case of

lesions that cause TIA. The benefit of endarterectomy in the prevention of ictus decreases after 2 weeks of TIA.

3. *Diagnosis of carotid artery disease.* An initial physical examination is required in order to detect the presence of a carotid bruit, which is associated with a greater risk of ictus.

4. *Recommendations.* The recommendations for diagnosing patients using imaging techniques are established through a comparison of the three different non-invasive methods available: duplex ultrasound, angio-MRI, and angio-CT. However, the normal diagnostic protocol is to start with duplex ultrasound and then choose angio-MRI or angio-CT in the case of diagnostic doubts after the duplex, or when it is necessary to assess invisible structures (aortic arch, supracervical lesions, etc.)

### Medical Treatment

The following comments expand upon the details that are partially discussed in the guidelines:

1. In addition to antiplatelet therapy, optimal medical treatment must include high doses of statins<sup>20</sup> (cholesterol bound to low density lipoproteins <100 mg/dl) and angiotensin-converting enzyme inhibitors for controlling hypertension.

2. For symptomatic patients, antiplatelet medication is recommended with low doses of aspirin (75 mg-325 mg).<sup>21</sup> For patients with asymptomatic carotid artery disease, low doses of aspirin reduce the frequency of cardiovascular events, but do not specifically affect the rate of ictus. The efficacy of antiplatelet treatment is similar to that of anticoagulants,<sup>22</sup> and so in the case of needing chronic oral anticoagulant therapy the treatment regimen would only involve dicoumarin with an international normalized ratio of 2.5 (range: 2-3). Double antiplatelet therapy with aspirin and thienopyridines does not provide any added benefit compared to antiplatelet monotherapy, except for following stent implantation (during at least 1 month).

### Endarterectomy

1. There is no benefit of performing an endarterectomy as compared to medical treatment in symptomatic women (and even less in asymptomatic cases).<sup>22</sup>

2. Despite the benefits of surgery, the difference in the results obtained using medical treatment is clearly lower in asymptomatic patients than symptomatic ones. Whereas in asymptomatic patients 40 interventions are required to prevent an ictus in 5 years, only 15 procedures are required in symptomatic patients.<sup>22</sup>

3. The results from octogenarian patients are similar to those in the youngest patients.

4. It is very important to involve a neurologist on the treatment team.<sup>23</sup> When a neurologist decides upon and implements the clinical evaluation of the patient, preoperative morbidity rates notably decrease.

5. Lesions in the high bifurcations, those located below the clavicle, a background of neck surgery or irradiation, occlusion of the contralateral carotid artery, and paralysis of the contralateral laryngeal nerve all have an unfavorable anatomy for endarterectomy.

### Endovascular Treatment With Carotid Artery Stent. Comparison With Endarterectomy

Dual antiplatelet therapy should be administered along with aspirin (81-325 mg/day) and clopidogrel (75 mg/day) for a minimum of 1 month before and after CAS implantation. It is also recommended that a neurologist perform a clinical examination 24h before and after the CAS. As in patients undergoing an endarterectomy, a noninvasive imaging test is recommended 1 month following CAS, after 6 months,

and then yearly in order to evaluate the permeability of the treated vessel and to rule out the development of new lesions in the contralateral vessel.

The CREST study<sup>24</sup> has demonstrated that with adequate training surgeons and operators can offer good results to both asymptomatic and symptomatic patients. Better results are obtained with CAS in preventing periprocedural infarction, while endarterectomy is more beneficial in reducing the risk of ictus; CAS is preferable in patients with high surgical risk,<sup>25</sup> as well as those with contralateral occlusion and restenosis following endarterectomy.

#### *Carotid Artery Disease and Cardiac Surgery*

In symptomatic patients with severe symptomatic carotid artery disease (>80%) pending coronary revascularization surgery, initial CAS is reasonable, with heparin treatment until the revascularization surgery (avoiding double antiplatelet therapy). In asymptomatic patients with severe carotid lesions, there have been no clinical results to support the use of carotid revascularization before coronary surgery.<sup>26</sup>

### **VERTEBRAL ARTERY DISEASE**

The guidelines clearly describe the physiopathology, diagnosis through imaging techniques, and treatment of vertebral artery disease.

#### **Treatment of Vertebral Disease**

In patients that suffer recurrent ischemic events despite antiplatelet therapy, revascularization should be considered, generally through endovascular procedures. The guidelines are lacking in the description of the anatomy, anatomical variants, and collateral circulation from other areas that could determine the strategy used for endovascular interventions that treat lesions of the vertebral artery.

#### *Positive Aspects*

The recommendations for treating vertebral stenoses based on consensus opinions are adequate, since no clinical trials have analyzed the efficacy of endovascular treatment.

### **UPPER EXTREMITY ARTERY DISEASE**

The structure and content provided by the guidelines are adequate.

### **MESENTERIC ARTERY DISEASE**

The structure and content provided by the guidelines are adequate.

### **RENAL ARTERY DISEASE**

#### **General Considerations**

#### *Positive Aspects*

There is a need for these guidelines in light of the most recent randomized studies investigating the treatment of choice in atherosclerotic patients with renal artery stenosis (RAS). The methodology and recommendations established are adequate, although there are some points that are not left completely clear.

#### *Debatable Aspects*

The guidelines do not establish a definition of RAS directly related to renovascular hypertension and ischemia due to the heterogeneity

of the populations included in the different studies and the different levels of RAS, which does not always imply a level of ischemia capable of sufficiently stimulating the renin-angiotensin-aldosterone system (RAAS) to produce arterial hypertension (AHT). On the other hand, ischemic nephropathy is produced by flow obstruction in both renal arteries or in solitary kidney patients due to involvement of an artery reducing glomerular filtration rate.<sup>27</sup>

#### **Diagnostic Strategy**

#### *Positive Aspects*

The recommendations provided for the diagnosis of RAS are clear and very applicable in clinical practice. A class I and level B recommendation is given for the first diagnostic test to be duplex ultrasound, followed by angio-CT or angio-MRI, with limitations described for each.

#### **Medical Treatment**

#### *Positive Aspects*

The guidelines recommend that the treatment of choice should be RAAS blockers and calcium antagonists. Although no randomized and controlled clinical trial is provided, data from the literature support the use of RAAS blockers as the first choice of treatment.<sup>28,29</sup> Not contraindicated by bilateral stenosis (or unilateral in solitary kidney subjects), RAAS blockers are the treatment of choice since stenosis is not significant in many cases, and should only be contraindicated by a drop in glomerular filtration rate >30%, in which case revascularization treatment should be considered.

#### **Revascularization**

#### *Positive Aspects*

There is no controversy regarding appropriate treatment; stenting and angioplasty provide the best results in patients with significant RAS (level A evidence).

#### *Debatable Aspects*

The most controversial aspect stemming from the most recent clinical trials is which patients should be offered revascularization treatment and which should be given medical treatment. The 3 most relevant randomized clinical trials have been the DRASTIC, STAR, and ASTRAL studies (Table).<sup>30-32</sup> With these clinical trials, we can affirm that, in clinically stable patients with renal atherosclerotic disease, medical treatment should be the first option (level A evidence). In clinically stable patients, treatment with angioplasty with or without a stent does not influence the renal prognosis, cardiovascular prognosis, or help to control blood pressure (level A evidence). However, these trials have limitations that are not shown in the guidelines: *a*) the number of patients with truly functional stenosis >70% is not clarified, since many patients had stenosis between 50% and 70%; *b*) patients with nonsignificant stenosis are included; *c*) standardized clinical criteria are lacking for AHT, and *d*) some patients that were randomized to receive medical treatment were given revascularization treatment based on the researcher's criteria. As such, the validity of the available results may not be applicable in patients with more severe stenosis, with functional repercussions defined as a rapid deterioration in renal function, uncontrolled blood pressure despite using 3 or more antihypertensive drugs, and repeated episodes of acute pulmonary edema.

With regard to revascularization treatment, the guidelines do not describe the factors that imply a negative prognosis and advise against

**Table**  
The Most Representative Clinical Trials Performed in Patients With Renal Artery Stenosis

Trial	Inclusion criteria	Randomization (no. of patients)	Results
DRASTIC <sup>30</sup>	RAS $\geq$ 50% and DBP $\geq$ 95 mmHg on treatment with 2 drugs or an increase $\geq$ 20 $\mu$ mol/l upon treatment with ACE inhibitors	PTA alone (56) vs medical treatment	No differences in controlling BP or creatinine concentrations; PTA decreased the number of antihypertensive drugs
STAR <sup>31</sup>	RAS $\geq$ 50%; GFR: 15-80 ml/min; stable BP	PTA and stent (64) vs medication (76)	No differences in controlling BP or in a drop of GFR $\geq$ 20 ml/min
ASTRAL <sup>32</sup>	RAS with no clear indications for revascularization	PTA with/without stent (403) vs medication (403))	No differences in renal events, CV events, or BP control

ACE, angiotensin-converting enzyme; CV, cardiovascular; RAS, renal artery stenosis; GFR, glomerular filtration rate; BP, blood pressure; DBP, diastolic blood pressure; PTA, percutaneous angioplasty.

its indication: severe renal failure (serum creatinine  $>3$  mg/dl), renal size  $<8$  cm, very proximal or intrarenal stenosis, and severe atherosclerosis.

The current recommendations can be summarized in the following points:

1. The diagnosis of RAS must be considered in any patient with a background of severe or resistant hypertension, above all when associated with renal failure or vascular disease.

2. The initial examination must include a measurement of renal function and lipid profile. The anatomical diagnosis can be made through a duplex ultrasound. If a high-quality image is not available, an angio-CT or angio-MRI can be used.

3. Patients with atherosclerotic stenosis of the renal artery need intensive medical treatment with a regimen including RAAS blocker and strict monitoring of serum creatinine and potassium levels. They also need antiplatelets and statins, along with adequate control of diabetes and renal disease progression.

4. The role of revascularization in the treatment of atherosclerotic stenosis of the renal artery is controversial, since the available data from randomized trials have not demonstrated any benefit in clinically stable patients. Pending the results from other clinical studies, we must resolve whether patients with a rapid deterioration of renal function, repeated episodes of acute pulmonary edema, or uncontrolled AHT with significant stenosis of the renal arteries can benefit from revascularization.<sup>33</sup>

## LOWER EXTREMITY ARTERY DISEASE

### Diagnostic Tests

#### Debatable Aspects

Ankle brachial index (ABI) is the main primary noninvasive diagnostic test. This guideline establishes a diagnostic cut-off point of  $<0.9$ , which contrasts with the definition for the presence of PAD if ABI is  $\leq 0.9$  in several studies and also the American guidelines. As an added value, the American guidelines have clearly established the cut-off points that define noncompressible ( $>1.4$ ), normal (1-1.4), borderline (0.91-0.99), and pathological ( $\leq 0.9$ ) arteries (class IB), which avoids any confusion and facilitates uniformity of clinical trials planning.

The guideline recommends measuring ABI as a screening and diagnostic tool for PAD (IB). This recommendation does not establish any particular group of patients by age or risk profile. The updated 2011 American guidelines also establish criteria for the application of ABI: symptoms revealed by stress tests of the legs, wounds that do not heal, age  $\geq 65$  years, or  $\geq 50$  years with tobacco use or diabetes.

### Therapeutic Strategies

#### Debatable Aspects

One limitation to the guidelines is the lack of concrete recommendations regarding conservative treatment, above all in

comparison to the more detailed specifications from the TASC II guideline.

As regards medical treatment, the primary drug treatments that are available are well described, but the guidelines do not provide indications of which to use when. The contraindications for these drugs are also not well explained. The TASC II guideline prioritizes the use of cilostazol since it has the greatest level of evidence suggesting benefits. This year, a document on the NICE guidelines was published regarding drugs for the treatment of intermittent claudication,<sup>34</sup> in which the first option of treatment is naftidrofuryl, while cilostazol and pentoxifylline are not recommended in the treatment of this disease.

### Treatment of Intermittent Claudication

#### Positive Aspects

This section recapitulates the therapeutic options that were already mentioned in the previous one, but arranges them using treatment algorithms that are both clear and simple.

#### Debatable Aspects

Cardiologists that are not familiar with the devices used for these procedures could benefit from a brief description of the most commonly used stents, which could have been included in the appendix: a) balloon-expandable stents, indicated in ostial lesions in areas that are not subjected to bending (ostium of both primitive and infrapopliteal iliac arteries, especially in proximal, short, and calcified lesions); b) self-expanding nitinol stents that are more flexible and have more radial force (at the iliac level, and greater femoropopliteal deformability), and c) polytetrafluorethylene-coated stents for both levels, used in lesions with a high thrombotic content or in vessel rupture, or in restenosis of the stent.

The IIa B recommendation for a primary femoropopliteal stent is debatable, since the majority of studies continue to consider balloon angioplasty as the standard treatment, especially in short, noncalcified lesions.

### Critical Ischemia in the Lower Limbs

#### Positive Aspects

The treatment algorithms for this condition are very interesting. Treatment with prostanoids continues to be the only alternative in patients that cannot undergo revascularization.<sup>35</sup> Procedures in the infrapopliteal area have the objective of saving the limb from amputation, not long-term permeability. The fragility and high comorbidity rates associated make surgery an impractical and unfeasible option. Simple angioplasty with a low-profile, dedicated balloon catheter continues to be the standard treatment and implanting a stent is reserved for angioplasty bail-out, especially in focal and proximal lesions.

## Debatable Aspects

We would like to see more on the natural history of this disease and its prognosis.

## Acute Ischemia of the Lower Limbs

### Positive Aspects

We should point out the differences in management for embolic etiology, normally cardiac due to atrial fibrillation (which should be treated using embolectomy with a Fogarty catheter), and thrombotic etiology. The guidelines support the use of intra-arterial fibrinolysis using a catheter in Rutherford stages I and IIa (urokinase or rTPA that can be used interchangeably); surgery is left as a treatment option for more severe stages of ischemia, and of course amputation in the case of irreversible ischemia. An angiography is needed at 24 hours to evaluate the results and, if possible, revascularize the causal lesions.

## CONCLUSIONS

This guideline provides a very pertinent general view of PAD and some very clear algorithms that aid in making decisions. The cut-off point established for diagnosing PAD is different than the conventional value. Special emphasis is placed on controlling risk factors, especially with regard to treating them, and to antiplatelet drugs for secondary prevention. The indications for more specific pharmacological treatment are not very concrete, in particular for the treatment of claudication, probably due to the lack of large randomized studies. Many technical details are provided for revascularization procedures that are very specific and aimed at vascular surgeons and interventional physicians.

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## CONFLICTS OF INTEREST

None declared.

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