

Lacune and lacunar infarct: A history of the concept and modern use

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Abstract

Lacune was a term first used in the European literature in the mid 19th century but was little used in English language medical literature until the publications of Charles Miller Fisher in the 1960's. The lacunar hypothesis is controversial and the terminology is best reserved for the pathological lesion. New clinical classifications of stroke such as that proposed in the TOAST study have demonstrated a high interphysician agreement rate and are widely employed.

The term lacune was first used by the French physician, Amédée Dechambre (1812-1886) in his description of post-mortem cerebral softenings in subcortical white matter [1]. His paper published in 1838 in the Gazette Médicale de Paris reported the pathology in a patient who had initially recovered from hemiplegia, 'A number of small lacunes of variable size and form, more or less filled with milky fluid...'. Lacune is derived from the Latin, lacuna, a pit or hole and in French, la lacune, a gap or empty space. Max Durand-Fardel in 1842 applied the term to these deep cavities and referred to the multiple small holes in the hemispheric white matter as 'l'état cribalé' (sieve-like state) [2]. Pierre Marie correlated clinical findings with multiple lacunes and described sudden hemiplegia with good recovery and a slow gait with small steps 'marche à petits pas de Déjérine', pseudo bulbar palsy and dementia [3]. He concluded that lacunae could be softenings caused by a 'local arteriosclerotic process' or a process of 'destructive vaginalitis', a dilatation of the perivascular space.

During the first half of the twentieth century the terms were seldom used in the English-language medical literature. Charles Miller Fisher popularised the lacunar hypothesis with careful clinical and pathological studies published in the 1960's [4]. He proposed that lacunar infarcts were small (< 15 mm diameter) infarcts due to occlusion of a single penetrating branch of a large artery and associated with a number of well-defined clinical syndromes including pure motor hemiparesis, pure sensory stroke, sensorimotor stroke, ataxic hemiparesis and dysarthria clumsy hand. Fisher's pathological studies established that the arteriopathy in

lacunes was a segmental disorganisation of the arterial vessel wall associated with an eosinophilic deposit or lipohyalinosis which was principally due to chronic hypertension. He also described atherosclerotic plaques, stenoses or occlusions of the penetrating or parent artery whilst a small percentage demonstrated haemosiderin-laden macrophages representing old micro-haemorrhages.

Brain imaging including CT and MRI has allowed the detection of lacunae in vivo. Newer MRI techniques employing diffusion weighted imaging (DWI) with measurement of the apparent diffusion co-efficient (ADC) have higher sensitivity for detecting small deep infarcts [5]. Imaging however is not able to demonstrate that an infarct is due to an occlusion of a single perforating artery. Many studies have also found that classical lacunar infarcts, confirmed on imaging, have other non-lacunar mechanisms of infarction including large vessel or cardiac embolism.

The lacunar hypothesis has long been controversial. Its detractors point to the variety of pathophysiologic mechanisms and demonstration of potential embolic sources in many cases [6]. Advocates of the model note that a minority of lacunes may result from emboli but that there are compelling clinical and epidemiological reasons for retaining lacunes as a distinct ischaemic stroke subtype [7].

Lacune and lacunar infarct are terms that are part of the medical parlance and have a history of use for over 150 years. Should they still be used or is it preferable to abandon them altogether? The concept is best reserved for the pathological lesion and the term subcortical stroke or small

deep infarct used for the clinical and radiological descriptions. A new system of categorisation of stroke subtypes based on aetiology was developed for the Trial of ORG 10172 in Acute Ischaemic Stroke (TOAST) [8]. The 5 subtypes of (1) large-artery atherosclerosis, (2) cardioembolism, (3) small-vessel occlusion, (4) stroke of other determined aetiology and (5) stroke of undetermined aetiology had a high interphysician agreement rate. By employing this terminology, the physician can avoid certain preconceptions and keep an open mind regarding the optimal investigation and treatment of individual patients with stroke.

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