

Произведены четыре операции кесарева сечения по акушерским показаниям (клинически узкий таз, тазовое предлежание в сочетании с ранним отхождением околоплодных вод и возрастом женщины, тазовое предлежание в сочетании с тенденцией к крупноплодию и обвитию пуповины вокруг шеи). Послеродовой период у всех женщин проходил без особенностей.

Проведенные исследования позволяют предположить, что эйтония и умеренная симпатикотония в покое в сочетании с симпатикотоническим и асимпатикотоническим типами ВР в третьем триместре беременности, вегетативное обеспечение физической деятельности с усилением тонуса симпатического отдела ВНС перед родами являются, по видимому, оптимальными для реализации адаптационных реакций организма при беременности, обеспечивают ее физиологическое течение и благополучный исход родов. Различие же двух групп, вероятно, является отражением различных вариантов нормальных уровней функционирования систем, на фоне которых протекает гестация.

Таким образом, при физиологическом течении беременности адаптационные процессы по обеспечению вегетативного гомеостаза осуществляются за счет усиления тонуса симпатoadrenalового звена, степень активации которого зависит от исходного функционального состояния регулирующих систем. Полученные нами данные подтверждаются законом гомеостаза об исходном уровне (закон "начального значения" Уайлдера): чем выше уровень исходной активности физиологического состояния, тем меньше относительное изменение этого уровня при воздействии импульсов одной и той же интенсивности.

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DETECTING A PATENT FORAMEN OVALE
BY TRANSCRANIAL DOPPLER SONOGRAPHY (TCD)

(5 years of clinical experience with a new method)

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Abstract. In patients with cerebral ischemia of unknown origin, paradoxical embolism must be considered as one of the possible causes, if there is an abnormal right-to-left shunt. The most likely site of transmission is a persisting patent foramen ovale (PFO), which is found in approximately 30% of adult persons in autopsy studies. Using transcranial Doppler sonography (TCD) and an agitated saline solution as an inexpensive and readily available contrast medium, probably all clinically important right-to-left shunts can be detected. In our department we examined 215 patients within the last 5 years, 30% of which had an abnormal right-to-left shunt with insignificant difference between 10 and 69 years of age.

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ВЫЯВЛЕНИЕ ДЕФЕКТА ОВАЛЬНОГО ОТВЕРСТИЯ
С ПОМОЩЬЮ ТРАНСКРАНИАЛЬНОЙ
ДОППЛЕРСОНОГРАФИИ(5-летний клинический опыт применения
нового метода)

В числе вероятных причин ишемического инсульта может быть парадоксальная эмболия в условиях аномального право- и левостороннего межпредсердного шунта. Основным путем заброса эмбола является функциониру-

щес открытое овальное отверстие, которое обнаруживается почти у 30% взрослых лиц при аутопсии. Применяя транскраниальную доплерографию на фоне внутривенно введенного взболтанного физиологического раствора, возможно выявить право- и левосторонний внутрипредсердный шунт в клинике. В течение последних 5 лет в нашем отделении было обследовано 215 пациентов с ишемическим инсультом, 30% которых имели аномальный право- и левосторонний шунт, не проявляющий себя клинически у лиц в возрасте от 10 до 69 лет.

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УНИВЕРСИТЕТ КИМЧЕЛЕН
ТРАНСКРАНИАЛЬ-ДОПЛЕРОГРАФИИ
ПРАВИМЕРНО АЧЫКААУ (ИРА ИСУАМЫ
КУАЛАНУМНАН Э БААМК ТОЮРШЕКЭ)

Новые инсульты, которые связаны с нарушением кровотока в мозге, являются парадоксальными. Они возникают в результате эмболии, которая происходит из венозной системы. Эмболия возникает в результате того, что венозные тромбы, которые образуются в венах, могут пройти через открытое овальное отверстие в сердце. В результате этого происходит нарушение кровотока в мозге, что приводит к инсульту. В настоящее время для диагностики парадоксальной эмболии используются различные методы, в том числе транскраниальная доплерография. Этот метод позволяет выявить наличие парадоксальной эмболии в мозге. Однако для этого необходимо использовать контрастные вещества. В настоящее время для этого используются различные контрастные вещества, в том числе микропузырьки. В настоящее время для этого используются различные методы, в том числе транскраниальная доплерография.

Paradoxical emboli as a cause of cerebral ischemias have drawn increasing attention of vascular neurologists, as in a considerable number of patients no other vascular, cardiac or thrombotic cause of stroke can be found. It is estimated, that about 15% of all ischemic strokes are caused by a paradoxical embolization via a potentially open foramen ovale [1]. Small thrombi may spontaneously form in one of the deep veins of the legs or the pelvis, especially when a person sits or lies without moving for several hours. When such a thrombus becomes an embolus, it must reach a certain size, to affect the function of the lung, usually about 8–10 ml. However, a blood clot much smaller than this may already occlude a cerebral artery long enough to produce a transient or permanent ischemic deficit. All it needs is an abnormal right-to-left shunt. The most likely location of this shunt is a patent foramen ovale (PFO). In rare cases, shunts on the pulmonary level are also possible.

The prevalence of a right to left shunt can be assessed by intravenous application of an ultrasound contrast-medium, which is unable to pass the lung and by detecting traces of this medium in the arterial system, either in the left half of the heart by transesophageal echocardiography (contrast-TEE) or by transcranial Doppler sonography (contrast-TCD). Using contrast TEE as a standard, the sensitivity of contrast-TCD was reported to be about 90% [5,6], the specificity about 93% [6,7]. Both methods proved to be similarly efficient to detect small amounts of echo-contrast bubbles [8], especially during the Valsalva maneuver. However, the i.v.-contrast-TCD method is more

convenient for examiners and patients; it is available in more neurological offices or departments, and it can detect not only a PFO but also abnormal shunts on the pulmonary level.

The autopsy incidence of PFO has been reported to be approximately 30% [3], whereas ultrasound contrast TEE reveals only about 10% of PFO in normal patients [2]. In younger persons with cerebrovascular events of unknown source, however, the incidence of PFO, as detected by contrast-TEE or contrast TCD, is reported to be approximately 50% [1,6].

METHOD

As an ultrasound contrast medium we use agitated saline solutions according to Teige and Sharma [7]: 7–9 ml of saline solution are mixed with 2 ml of fresh venous blood and about 0.1 ml of air between two hypodermic syringes attached to a 3-way adapter. Some of our cases were also examined with 10 ml of Echovist® (micro air bubbles surrounded by a thin layer of galactose), showing identical results. In 1991–1994 unilateral examinations of the middle cerebral artery with a hand held probe on the affected side of the brain were performed during and after repeated i.v. injections of ultrasound contrast solutions into a cubital vein without and with a Valsalva maneuver. In case of a negative result this procedure was repeated on the contralateral middle cerebral artery, in some cases also after changing the side of injection. Since 1995 bilateral examinations of both middle cerebral arteries were performed using two probes fixed with a special head gear simultaneously. Appearance of contrast-enhanced signals within 8–10 heart cycles were considered to prove a PFO, repeated delay of microembolic signals until the 11th cardiac cycle or later were suspicious of a pulmonary shunt.

RESULTS

Up to now, we examined 215 patients (108 male, 107 female) with sudden cerebral events suspicious of ischemias. Most of these cases were thought to be thrombo embolic, but some may have had vasculitis (elevated ANA titer), complicated migraine (migraine accompagnée), or disturbed coagulation (e.g. elevated anti-cardiolipine levels). Two cases with multiple sclerosis also had a PFO, and neither case history nor clinical examination or MRI could distinguish between individual lesions caused by demyelination or by ischemias. None of the patients had stenoses of the extra or intracranial arteries (all were examined by Doppler and duplex sonography) or possible cardiac sources of emboli (normal ECG and echocardiography). Of these 215 patients 65 (33 male,

32 female, averaging 30 %) with a persisting right to left shunt were detected, only two of them with a pulmonary location (one with severe chronic obstructive lung disease, the other one with Osler's teleangiectasis). The examination method had no side effects.

Bilateral testing was not significantly superior to unilateral testing; most cases had positive echo contrast signals in both middle cerebral arteries, so that unilateral examinations were sufficient, even when using a hand held probe. Fixing the probes with a special head gear, however, had the advantage of fewer artifacts and of fewer injections of contrast medium needed. The incidence of an abnormal shunt was not significantly influenced by age; in every subgroup between 10 and 79 years of age about 30% of the cases had a right-to-left shunt with the highest incidence between 60 and 69 years (36%) (see figure).

DISCUSSION

Paradoxical embolism may be a cause of stroke at any age, and contrast TCD is a relatively reliable and easy to use method of detecting a possible site of transmission. Yet our results of about 30% of abnormal left-to-right shunts in patients suspicious of cerebral ischemias without any other cardiac or vascular cause seem to be somewhat less effective than those reported elsewhere in recent literature. We consider several explanations:

a) our patients include some with possible other reasons for cerebral ischemia, some with complicated migraine (early communications suggested, that a PFO may be the true source of the vascular complications), some with multiple sclerosis, and some with a disorder of their coagulation; we could not possibly exclude the latter group, as a disorder in coagulation may be one of the reasons, why a blood clot will form in the deep veins before it becomes a paradoxical embolus;

b) instead of an expensive pharmaceutical preparation like Echovist® we used agitated saline solutions with blood and minute amounts of air. The costs of this preparation are near to nothing. However, Echovist® may be somewhat more stable;

c) the cubital vein may not be the optimal site for injecting a contrast medium, which should pass through an aperture of the atrial

septum. Recent unpublished communications suggest, that the femoral vein may yield better results. If a cubital vein is used, it may help to elevate the arm and tell the patient to use his muscle pump during injection of the contrast medium and the Valsalva maneuver [1].

By injecting an agitated saline solution into a cubital vein instead of Echovist® into the femoral vein, we may have missed a PFO in a few percent of our patients. We assume, however, that if a PFO is missed, it must be very small and unlikely to form a possible site of transmission for a paradoxical embolus. We therefore recommend agitated saline solutions as relatively reliable and inexpensive contrast media when used with transcranial Doppler (TCD) in the search for an abnormal left-to-right shunting.

A patent foramen ovale, however, does not necessarily induce a cerebro-vascular event, just as a carotid stenosis is not always the source of a cerebral ischemia. Careful exploration of the case history in respect for situations, in which deep venous clot formation could have occurred, and careful physical examinations are always necessary [4]. Studies of the coagulatory status may be useful. Preventive treatment must be adjusted to each individual case. In a few patients no continuous treatment may be necessary, with the exception of injecting heparin, whenever a longer rest is unavoidable. Cigarette smoking ought to be discontinued in every case. In our female patients the intake of estrogens was discouraged. A few patients received continuous anticoagulant therapy. The patient with Osler's teleangiectasis in his lung was successfully treated by interventional angiography (particle-occlusion) of the malformations.

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