

Vascular Disturbances and Mental Disorders

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ABSTRACT

From a consecutive series of 257 patients (113 F; 144 M; average age 62,77) 24 were selected for vascular surgery. The series was subdivided into a vascular group (186) and a psychiatric group (71). The relationship between vascular disturbances and organic brain syndromes was examined. Diffuse vascular disturbances seemed to play a role in delirium, multiinfarct dementia and discrete mental disturbances. Basilar insufficiency seemed more important than carotid insufficiency in discrete mental disturbances. Depressions were only associated in about 22% with vascular disturbances. Right carotid disturbances tended to predominate in depressions. Delirium tended to be associated with acute vascular disturbances, depression was more frequently associated with chronic vascular disturbances although we had excluded well established vascular accidents. This is a pilot study and larger numbers of patients must be examined before reaching more definite conclusions.

INTRODUCTION :

In 1980 Barolin from Austria published a series of 200 cerebrovascular accidents of those 30% were associated with depressions. He did not notice any predominant lateralisation but found the CVA in the carotid territories correlated with 27,5% of the depressions as against 44% of the CVA in the basilar territories.

Robinson et al. (1984) found depressive disorders in 13/30 stroke patients, with a clear predominance on the left (11/13) especially in anterior lesions (6,11) within the first two weeks after the stroke.

METHOD, ORIENTATION AND PURPOSE :

During 1980 and 1981 we evaluated 257 patients with vascular complaints and/or psychiatric complaints in view of vascular surgery. From this study patients with definitely non vascular etiologies, brain tumors, head injuries etc have been excluded. We also excluded patients with an established permanent stroke and only considered prodromal neurological symptomatology.

All patients were submitted to a neurological and psychiatric evaluation, all of them had biological and cardiovascular examinations, all of them had an EEG, an echoencephalogram, (no scanner being directly available), and a Doppler sonography as routine screening procedures and according to the results were selected for brain scans, angiographies and vascular surgery.

As these investigations permitted to a certain extent to localize vascular disturbances and to correlate them to mental disorders we asked ourselves four questions :

- 1) What is more important in mental disorders in old age, localized or diffuse vascular disturbances ?
- 2) Do some psychiatric disorders tend to correlate to acute vascular disturbances and others to chronic vascular changes ?
- 3) How do vascular disturbances in the carotid territories compare to those in the basilar territories ?
- 4) How does the symptomatology of a left carotid lesion compare to a right carotid lesion ?

GENERAL RESULTS :

257 patients (113 female, 144 male) at an average age of 62.77 were selected as presenting a probable, or possible, vascular background to their clinical symptomatology.

Of these 257, 186 showed a predominantly vascular, 71 a predominantly psychiatric clinical picture, 24 were selected after angiography, for vascular surgery by the criteria of Fields (1982) as presenting isolated or predominantly localized vascular lesions (carotid stenosis, bulbar plaques, kinking, subclavian steal etc).

Of these 24, 19 patients were actually operated. 22 of these surgical patients had predominantly vascular complaints, although sometimes associated with psychiatric symptoms. Two of the surgical patients had presented with depression and subsequent neurological examination revealed in one a rightsided carotid bruit due to a carotid stenosis and in the other a tensional asymetry related to a left subclavian steal and bilateral bruits due to carotid stenosis predominant on the right.

Almost half of the patients (46/.) presented some kind of vascular attacks. If we had added transitional confusional states, (delirium) lasting from several hours to several days (17) and reversible coma without residual signs (3 patients not included in this series) the cerebral attacks would have added up to 139/260 (53.5%).

Attacks were found in all the groups of a generalized as well as of a localized nature.

The average age of all patients was 62.77, the surgery patients tended to be slightly younger (60 years) as age played a role in their selection, only the delirium group (17 patients at an average age of 73.47) was clearly composed of older patients.

The vascular group with primarily vascular complaints (164 patients) showed a clear predominance of T.I.As in the vertebral and

basilar territories (85), as against (45) in the carotid territories and (28) with generalized vascular symptomatology (intermittent claudication, coronary disturbances, ill defined transitory troubles of concentration, memory, etc).

The psychiatric group classified according to the DSM III (71 patients) showed 33 affective syndromes, all depressions, followed by 17 cases of delirium (transitory confusional states) and 12 cases of dementia (presenile, senile and multiinfarct). The other groups were small or non existent.

The surgical group (24) was younger (60) and predominantly male (18/24.)

In analysing the symptoms and signs leading up to surgery, the cerebral attacks (carotid TIA, PRIND, epilepsies, syncopes, migraines) predominated largely, whilst among the clinical signs, carotid bruits and inversion of ophthalmic flow seemed important. Amaurosis fugax and ophthalmic inversion seemed by far the most significant symptoms and signs, whilst vertebral TIA's, TGA and drop attacks did not lead to surgery.

Mental complaints in the vascular groups :

These were usually mild complaints of a subjective but distressing kind like anxiety, difficulties in concentrating, insomnia, mild depression, fluctuating impairment of memory, lightheadedness, fluctuating difficulties in coping with intellectual tasks, fatigue etc..

The general vascular symptomatology was also of a diffuse kind, without precise cerebral localising signs or symptoms. We included in this group peripheral vascular symptomatology, ischemic heart disease, chronic hypertension, heavy smoking, overweight, biological disturbances (diabetes, uricemia, increased lipids) and in all patients two or more of these factors were associated. This group showed the highest incidence of mild psychic complaints (25%).

The vertebral or basilar group included all patients who showed transitory evidence of basilar ischemia, with typical localising signs (vertigo, diplopia, dysarthria, dysphagia, alternating pyramidal signs etc) often varying from one attack to the other, of longer duration, without lasting sequelae. The incidence of psychic complaints was 23,5% possibly linked to the distressing and frightening nature of the basilar symptomatology.

The carotid group showed especially TIA or PRINDs (prolonged reversible ischemic neurological deficits), right or left, more stereotyped, of shorter duration and with complete recovery. The incidence of psychic symptoms was much lower (13.33%). As was to be expected, patients with a mixed vascular symptomatology (carotid and vertebral) were situated in between both groups (16.66%).

Finally, the surgical group, younger patients in good general health selected for isolated or clearly predominant carotid pathology, showed the lowest incidence of mild psychic symptoms (8,33%). It must however be noted that the psychic subjective symptomatology improved after surgery not only in the two patients with depression but also in some patients without any noticeable subjective complaints before surgery. They said they felt much improved (and this has been confirmed by their families) in alertness, memory, intellectual capacity, initiative, mood etc. This tends to suggest that deficient blood supply, resulting in a low flow endangered brain (LFEB) with corresponding mental impairment as suggested by Jacobs *et al.* (1982), might be at the origin of decreased mental performance.

Organic mental disorders and associated vascular disturbances

Incidence of vascular attacks :

As we had looked for vascular disturbances the psychiatric group was smaller (71 as opposed to 186) but still significant.

The incidence of attacks of a vascular kind was about the same

in the organic mental disorders (39,4%) as in the vascular group (40,8%) and the incidences of different types of attacks seemed to be roughly the same with the difference of TGA having been classified under organic mental disorders and of late migraines which were found in the vascular group. The high incidence of attacks (39,4%) in a group having been examined for mental disorders suggests a vascular background but we have to admit that the "attacks" were elicited on closer questioning of the patient or his family and that other psychiatric disorders, especially organic delusional syndromes and organic personality disorders, without any symptoms suggestive of vascular disturbances are not found in this pilot study.

Delirium (acute confusional state, acute brain syndrome) :

Classically delirium (Lipowski, 1980) is a transient, reversible, fluctuating, confusional state, associated with a disorganisation of the sleep wakefulness cycle, polyfactorial in origin, associated with an abnormal EEG and more frequent in elderly patients. This has been fully confirmed by our study.

The average age of our 17 patients was 73,47. In all our cases delirium was reversible, fluctuating and lasted from hours to weeks. Delirium was certainly polyfactorial (we listed 33 constant and 7 transitory factors 2,35 pro patient) and this is only a part of the factors listed by Lipowski (1980).

The EEG was abnormal in 82,3% and severely abnormal in 52% of the cases. Lipowski describes the decrease in frequency of the EEG background activity. This in itself would not be highly significant in this age group. But in our series, apart from a slowing of the background activity, we noted, during the attacks, diffuse slowing in the theta range, fluctuating mixed frequencies in the slow alpha, theta and sometimes delta range, and localised slowing as well as asymmetries of background frequencies in half the cases; all suggestive of diffuse metabolic disturbances associated with local vascular dysfunction.

As to the vascular disturbances observed on Doppler sonography 29% showed involvement of two arteries, 52% involvement of 3 or 4 arteries, and thus 81% of the patients could definitely be considered as vascular. Among the other factors surgery (4), cardiac arrhythmia (4), minor vascular accidents (6) and hypertension (4) seemed the most frequent. Five patients showed marked cerebral atrophy on the brain scan, the significance of this is not clear (Busse et al., 1981).

Dementias : Of the 12 dementias at an average age of 65, 75, slightly above the average of all the patients (62,77) :

three were considered as presenile

four as senile

four (multiinfarct dementias) as vascular and

one as relating to an internal hydrocephalus.

Cerebral attacks of various kinds were present especially in the multiinfarct group 3/4, and in senile dementia 2/4.

Doppler sonography showed no significant stenoses in the presenile dementias clearly of Alzheimer type, but significant involvement of 3 or 4 arteries not only in the multiinfarct dementias, as was to be expected, but also in the senile dementias where degenerative and vascular disturbances seemed to be equally important.

None of our dementias has been selected for surgery. One of the multiinfarct dementias died a few days after angiography. This is the only casualty in our series.

Dementia is considered a behavioural manifestation of relatively widespread cerebral pathology with multifactorial causation (Lipowski, 1980) and thus associated vascular changes might contribute to more severe forms and more rapid evolutions.

Amnesic syndromes : Classically (Lipowski, 1980) amnesic syndromes can be chronic (Wernicke-korsakoff's syndrome) or transitory (transient global amnesia),

In our series we had two chronic korsakoff's syndromes after repeated vascular accidents and in one the scanner showed bilateral involvement of caudate nucleus and thalamus.

We saw a large series of over 50 TGA's in the past 25 years, but only 4 of these appear in this study.

The EEG was not significant and although the Doppler sonography showed some carotid and vertebral involvement this was not considered as significant in this age group (age 64).

In a very extensive study Mumenthaler et al. (1980) called the attention to vasomotor factors like hot baths, cold showers, effort, coitus, and to the possible role of hypertension.

Organic hallucinosis : Lipowski (1980) considers organic hallucinosis as a mental disorder in which recurrent or persistent hallucinations in a state of full wakefulness are the predominant or only symptom and are attributed to some clearly defined organic factor.

In our series we found three cases where we considered the possibility of vascular etiology as one patient had a pseudobulbar syndrome (without dementia) and the two other ones had experienced drop attacks.

All the patients recognized their hallucinations as not being true perceptions. The hallucinations were visual in two cases, auditory in one, and in all cases transitory phenomena which had not much bothered the patients who mentioned them rather casually. Doppler sonography showed involvement of 3 arteries in one patient, of 4 arteries in two patients. Brain scan showed diffuse atrophy, without dementia, in all cases. Our series is rather small and allows no conclusions. We suggest however that hallucinosis associated with vascular, especially vertebral, symptomatology might be more frequently discovered when looked for, and that the awareness of the nonreality of the hallucinations might be a significant feature after all.

Organic affective syndrome :

Our series of 33 patients showed exclusively depressions. There was a slight predominance of women (20 F; 13 M) and there was no significant age group. Transient ischemic attacks (17/33) were almost as frequently carotid in origin as vertebral, 5/8 carotid disturbances were right sided, 2/8 bilateral and only one left sided. Three further cases of depression without localising signs were later followed by left sided hemiplegia.

Doppler sonography showed no vascular involvement in almost half the cases (48%) severe involvement (multiple or severe stenosis) only in 27% of these patients. These results only allow the conclusions that about half the depression of this age group are definitely not associated with vascular changes and that less than a quarter of depressions seem to be closely associated with significant vascular changes, which corresponds to the findings of Ladurner *et al.* (1981). We further conclude that in depressions, as opposed to the more complex but slight psychic symptomatology of the vascular group, vertebral changes do not predominate but that in depressions right sided carotid involvement, at least in the prodromal stage, might play a role. Barolin (1980) studied well established cerebrovascular accidents which were excluded from this series.

Organic delusional syndromes and organic personality syndromes :

Although during two years we have seen some patients who might have fitted these categories there were no signs to suggest vascular involvement. Some were of a younger age group and others had no concomitant vascular symptomatology. Thus two groups do not appear in our series.

DISCUSSION :

By describing seven organic brain syndromes, two with relatively **global cognitive impairment (delirium and dementia)**, two with relatively circumscribed cognitive impairment or abnormality (amnesic

syndrome and organic hallucinosis) and three predominantly manifested by personality disturbances (organic affective syndrome, organic delusional syndrome, organic personality syndrome) the DSM III has provided "a hypothesis that can be tested" (Lipowski, 1980) as to their relationship with organic causal factors such as vascular disturbances.

The primary aim of our work was to assess the vascular state of elderly patients and select those who might benefit by vascular surgery. This very quickly led to the question what kind of neurological events (especially different types of cerebral attacks) and what kind of mental disorders might be more closely correlated to vascular disturbances. In order to assess the type and localisation of vascular disturbances we used the clinical history and examination and further investigations especially EEG and Doppler sonography (in all cases), brain scan and angiography, used in about one patient in five. Surgery was indicated in about one patient in ten.

This gave us some idea as to which vascular lesions were more generalized, which ones were more localized, which ones were predominantly vertebral, which ones predominantly carotid, which ones predominantly right sided and which ones predominantly left sided, which ones acute and which ones chronic.

However, vascular disease by definition is widespread and fluctuant; thus all these informations are to be considered as predominant tendencies rather than as precise localisations or steady forms of evolution.

The correlation of the hypothesis of the organic brain syndromes proposed by the DSM III with the predominant features of the vascular disturbances could only result in identifying trends in correlations and with a limited number of patients, a considerable number of variables and only an approximate idea of precisely defined lesions the best we could hope for was preliminary results helpful in orientating further research.

With these reservations in mind we shall present some "conclusions".

CONCLUSIONS :

Relative importance of **localized** and **generalized** vascular disturbances in mental disorders :

In episodes of delirium, multiple stenosis of the carotid and vertebral arteries (three or even four vessels involved) seemed to provide the background in most cases. However as an episode of delirium is of polyfactorial origin it can occur without any major vascular disturbances.

About one in four patients with generalized vascular disturbances presented discrete but multiple psychic complaints;

anxiety, insomnia, problems of memory and concentration, depressive tendencies, etc. This may be due to a subjective awareness of symptoms eliciting emotional responses and coping mechanisms.

Psychic complaints were rare (2/24) in well defined surgical vascular lesions. However not only two patients with depressions, but also several other patients who underwent vascular surgery without previous psychic complaints; declared they felt more active, energetic and enterprising after surgery.

Vascular disturbances in the **carotid** territories as compared to the **basilar territories** :

Mild psychic complaints seemed more frequent in basilar disturbances but this might only be an emotional reaction to a more distressing symptomatology.

Depressions however seemed to occur just as frequently with carotid lesions (8) as with basilar disturbances (9). These results do not support Barolin's conclusions who observed depressions more frequently after vascular accidents in the basilar territories. The difference between the clinical material of Barolin and ours is that he observed

a series of completed strokes whilst we observed patients presenting preliminary symptoms. Only systematic localized cerebral bloodflow studies may tell us how much a bruit or TIA relates to a disturbed bloodflow in the corresponding hemisphere. It seems however worthwhile to record bruits, TIA's and their relationship with depressions

Left carotid lesions as compared to right carotid lesions

Barolin in his series of completed strokes observed no difference as to lateralisation in depressed patients. In our series we observed five right carotid lesions with corresponding TIA's or bruits, two bilateral bruits with one left sided subclavian steal and one left carotid bruit. The findings should be verified by larger numbers of TIA's, bruits and systematic Doppler sonographies.

Acute and chronic vascular changes : Delirium certainly relates to acute vascular events with generalized effects for instance cardiac arrhythmias, in association with other factors and multiple stenoses of the major arteries. Subjective awareness of lowered mental performance (lack of concentration, fatigue, memory troubles etc. and their emotional response such as anxiety and insomnia etc) seem to relate to chronic vascular insufficiencies predominantly of a generalized nature, and were in some cases relieved by surgery.

Depressions according to Barolin seem to relate to chronic well established basilar lesions rather than to carotid lesions. In our series however they related quite as often to active carotid disturbances as to active basilar disturbances. Depressive reactions in the early phase after completed stroke are not considered in this series.

General conclusions :

This study of 257 patients suggests that vascular disturbances definitely relate to delirium, to multiinfarct dementia, and to a lesser extent to senile dementia as well as to mild disturbances of mental

performance (alertness, memory, power of concentration, initiative etc), their emotional reaction and coping mechanisms.

The role of vascular disturbances in depression is less clear. More than half of the depressions after sixty did not show any significant vascular disturbances but in the rest the rate of carotid or basilar disturbances could be discussed, there being some arguments for right carotid disturbances in evolutonal vascular troubles and some arguments for basilar disturbances in prodromal symptomatology as well as in completed stroke.

Without allowing any definite conclusions and keeping in mind the diffuse nature of vascular disturbances as well as the polyfactorial etiology of organic brain syndromes in elderly patients this pilot study provides some interesting suggestions for larger investigations.

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الموجز

اضطرابات الأوعية الدموية والاضطرابات العقلية

اختير ٢٤ مريضاً لإجراء جراحة بالأوعية الدموية من بين سلسلة
متعاقبة من ٢٥٧ مريضاً (١١٣ من الإناث و ١٤٤ من الذكور) ، يبلغ
متوسط أعمارهم ٧٧ - ٦٢ سنة . وقد قسمت السلسلة الى مجموعة تعاني
من اضطرابات في الأوعية الدموية (١٨٦) ، وأخرى تتكون من مرضى
نفسيين (٧١) .

وقد تم فحص العلاقة بين اضطرابات الأوعية الدموية وزملاات المخ لعضوية حسب التقسيم الوارد في دليل التشخيص والاحصاء الأمريكي الثالث .

ويبدو أن اضطرابات الدورة الدموية المخية المنتشرة تلعب دورا في حالات الهذيان والعتة الناتج عن التخثر المتعدد بالمخ والأعراض العقلية المحدودة . ويبدو أيضا أن نقص كفاءة الدورة الدموية بالشریان القاعدي يلعب دورا أكثر أهمية من الحالة المماثلة بالشریان السببائی في أحداث الأعراض العقلية المحدودة .

وتميل اضطرابات الشريان السببائی الأيمن الى الظهور بكثرة في حالات الاكتئاب . أما الهذيان فيصاحبه عادة اضطراب حاد بالأوعية الدموية بينما يكون الاكتئاب مصحوبا باضطراب مزمن في الأوعية الدموية . ورغم أننا استثنينا الحوادث الثابتة للأوعية الدموية ، إلا أن هذه الدراسة تعد تمهيدية، ويحتاج الأمر الى فحص عدد أكبر من المرضى ، قبل الوصول الى استنتاجات محددة .

ABSTRAIT

Les Troubles Vasculaires et les Maladies Mentales

D'une série consécutive de 257 malades (113 F; 144 M; âge moyen 62,77) 24 ont été choisis pour une chirurgie vasculaire. La série a été divisée en un groupe vasculaire (186) et un groupe psychiatrique (71). La relation entre les troubles vasculaires et les syndromes cérébraux aigus a été examinée.

Les troubles vasculaires diffus semblent jouer un rôle dans le délire, la démence due à une multitude d'infarctus (multiinfarct dementia) et les troubles mentaux discrets. L'insuffisance basilaire semble plus importante que l'insuffisance carotide dans les troubles mentaux discrets.

La dépression était associée dans 22% des cas seulement, avec les troubles vasculaires. Le délire avait tendance à être associé avec les troubles vasculaires aigus, tandis que la dépression était associée avec les troubles vasculaires chroniques. Un plus grand nombre de malades devraient être examinés avant de pouvoir atteindre une conclusion définitive à ce sujet.