

Digital Subtraction Angiography : Can it be a Useful Method in Cerebral Ischemia?

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✓ Bu yazıda, DSA'nin (Dijital Subtraksiyon Anjiyografi) tıkaçıcı serebrovasküler hastalıklardaki diyagnostik değeri incelenmiştir. Serebral infarktlı 20 hastaya DSA incelemesi yapılmıştır. 12 hastada tanıyı aydınlatan yeterli vasküler demonstrasyon ve medikal tedaviye yön verebilen ek bilgi sağlanmıştır.

Anahtar Kelimeler: Serebral iskemi, dijital subtraksiyon anjiyografi.

✓ In this paper the diagnostic value of DSA (Digital Subtraction Angiography) in the evaluation of obstructive cerebral vascular diseases has been searched. DSA has been applied to 20 patients with cerebral infarct. In 12 patients sufficient vascular demonstration and additional information which would be able to effect the choice of medical therapy were obtained.

Key words: Cerebral ischemia, digital subtraction angiography.

INTRODUCTION

In daily clinical practice, cerebral ischemic cases are diagnosed by CT (computerized tomography) and medical treatment is planned according to this. The management of a complex pathological issue such as cerebral ischemia with simplified diagnosis-treatment plans supply many benefits. However, this concept can result revealing only a part of the undergoing process. Furthermore, discordance of clinical findings and CT comments is a state that a neurologist is not rarely confronted with.

In detailed radiographic demonstration of cervical and intracranial vascular lesions, the most precious method is selective transarterial angiography^(1,2,3). However, its risks determine the value of this method^(2,3). In this connection, many studies supporting the opinion that IVDSA (Intravenous Digital Subtraction Angiography) can be an alternative method of CSC (Conventional Selective Catheterisation) have been made^(4,5,6). In these studies, IVDSA is declared to be successful especially in cervical vascular lesions, but cerebral ischemia does not only depend on the obstruction of cervical part of internal carotid artery⁽⁶⁾.

Recently, there have been significant progresses in resolution of computerized techniques and digital electronics. Also in some advanced clinics, it was shown that the risks of catheterisation administered by experienced groups can be decreased⁽⁷⁾. This situation leads to the opinion that IADSA (Intraarterial Digital Subtraction Angiography) can be considered as a remarkable diagnostic tool in cerebral ischemia.

MATERIAL and METHODS

Twenty patients hospitalized due to obstructive cerebrovascular disease at the Ankara Hospital, Department of Neurology, between September 1988 and January 1989, were included in the study. The type and degree of neurological deficits of the patients were determined by clinical observation. The patients without neurological deficits and the patients having evident cardiac and renal problems were not included.

It has been demontsrated that cerebrovascular disease is due to obstruction by applying CT to all of the patients. Angiographic examinations were realized by An-

gioscope-C angiography apparatus and Digatron II Digital Subtraction Angiography unit at the Department of Radiology of Medical Faculty of Gazi University. In all examinations, both of the carotid and vertebral arterias of all patients were catheterized. 5 F 45 Diagnostic soft type and 5 F 45 Diagnostic soft type and 5 F Simmons II Schneider-Shiley catheters were used. 50 % diluted 6 cc. non-ionized contrast substance (Omnipaque 300 mg/ml) were given to carotid arterias, 30 % diluted 4 cc. were given to vertebral arterias at a rate of 3 ml/sec.

By the evaluation of DSA results 3 groups were classified:

Group 1-Non-diagnostic: Angiogram that gave no more information than CT.

Group 2-Diagnostic : Angiogram which provided adequate vascular image in diagnosis.

Group 3-Highly diagnostic : Angiograms that can be correlated with clinical findings and suggest the prognosis and manage the treatment were taken in this group.

RESULTS

The results are given at Table I and Table II.

Table I

CLASS	Specified total of patients
Group 1	2
Group 2	6
Group 3	12

Group 1 - Non-diagnostic

Group 2 - Diagnostic

Group 3 - Highly-diagnostic

There were two patients (10%) at group 1. In one of these, there was a small infarct at the right occipital lobe (Case 15). The other patient at group 1 (56 years old, male) had an evolving infarct at right cerebellar hemisphere (Case 16).

The distribution of highly-diagnostic group

Table II

Angiographic diagnosis	Specified total of patients
Candidates of surgery	2
Vasospazm	3
Complete occlusion	7

The number of the angiograms in group 2 is six. A perfusion decrease in the right posterior cerebral artery were observed (female, 72 years old-case 8). In case 12, the presence of a left frontoparietal infarct were demonstrated by CT (male, 65 years old-case 12). His angiogram showed a neovascularisation at the left lateral ventricle. In case 13, the existance of multiple stenosis at the left anterior cerebral artery were exposed (female, 62 years old). In case 3, CT report had defined a frontotemporo-parietal infarct, DSA had determined a constriction at the A₁ segment of the right anterior cerebral artery (male, 62 years old). In case 18, angiogram demonstrated a stenosis at the M₁ segment of the left carotid artery (male, 60 years old). His CT revealed thalamic infarct.

Group 3 consisted of twelve patients. In three patients DSA demonstrated the presence of vasospazm, case 1 (male, 56 years-old), case 7 (female, 45 years old) and case 11 (female, 55 years old).

Complete obstruction were seen at internal carotid, and posterior cerebral arteries or at one of the vertebral arteries of the patients from group 3; case 4 (female, 38 years old), case 9 (female, 23 years old), (Fig. 1a-1b) case 10 (male, 64 years old), case 14 (male, 56 years old), case 17 (male, 68 years old), case 19 (male, 55 years old) and case 20 (female, 45 years old.) A decrease in perfusion of right posterior cerebral artery were demonstrated at case 6 (male, 83 years old) (Fig. 2a-2b).

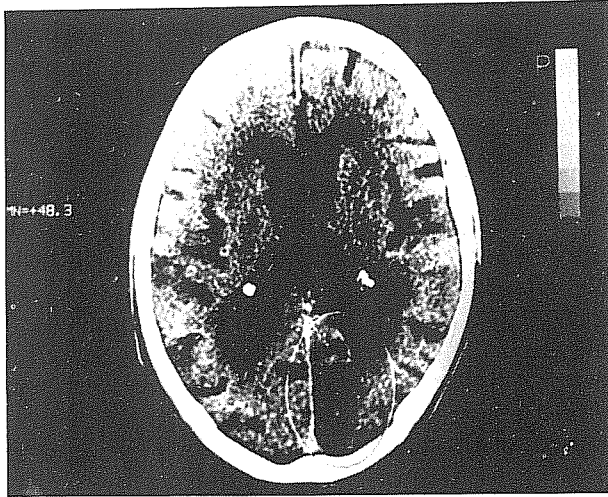


Fig.-1a: Right occipital ischemic infarct. (Case 10-male, 64 years old)

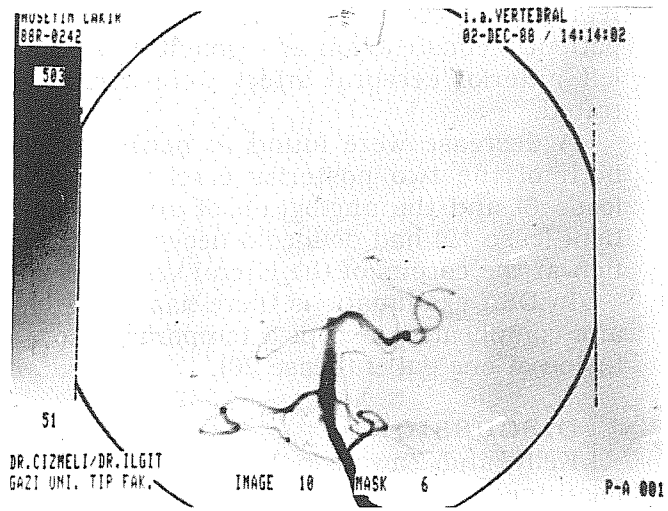


Fig.-1b: The complete occlusion of right posterior cerebral artery. (Case 10).

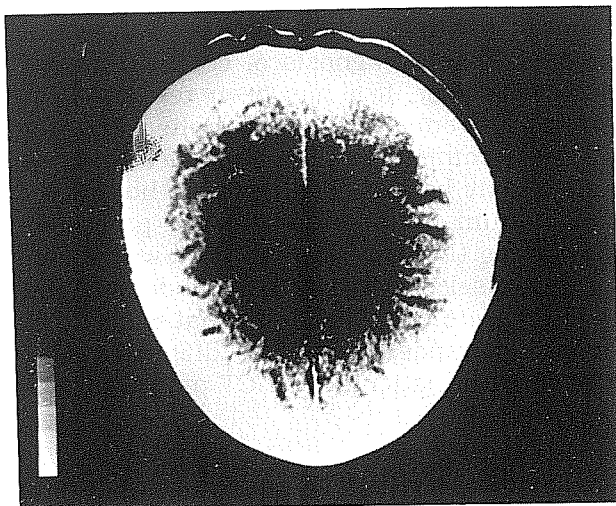


Fig.-2a: A low density lesion at the right posterior parietal zone (Infarction or glial tumor) (Case 6-male, 83 years old).

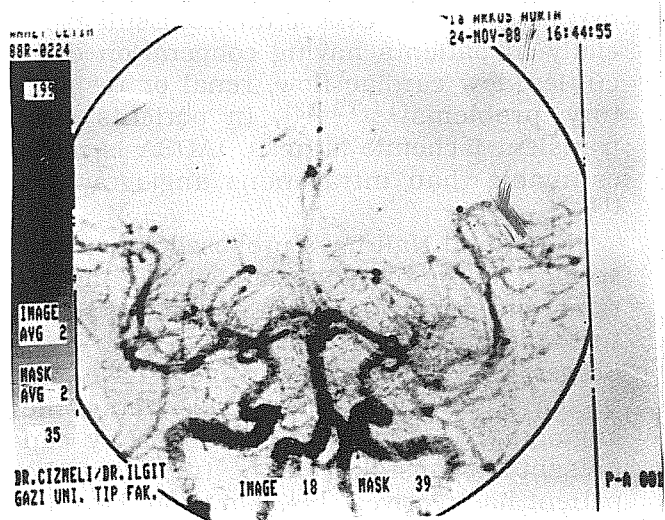


Fig.-2b: Decreased perfusion of the right posterior cerebral artery (Case 6).

An infarct were observed at the left frontotemporoparietal branch of middle cerebral artery (case 3). In IADSA of the same patient a construction at segment A₁ of the left anterior cerebral artery were demonstrated.

A decrease were found in perfusion of both of the two posterior cerebral artery (case 6) and the angiogram of another patient (case 12) had defined a neovascularisation at the corpus of the lateral ventricle.

In DSA examinations there has not been any complication except a temporarily confusion at one patient (case 20).

DISCUSSION

Kelly and Zawadzki have declared the usefulness of IADSA in urgent problems and that they have a belief in expanding the limits of indications⁽⁸⁾. The high contrast resolution in DSA developed the concept of intraarterial diagnostic and therapeutic angiography^(7,17).

The studies of Modic et al. have shown that the diagnostic value of intravenous administration of DSA is 66 % and that IADSA certainly provides much more information⁽¹⁰⁾. The IVDSA is unsuccessful especially in patients having cooperation difficulties, low cardiac flow, renal or respiratory problems^(11,12,13). In patients with transient ischemic attacks, IADSA is more estimable than intravenous angiographies⁽¹⁴⁾.

Klein and Hall have proposed the use of seriographies, receiving late phase angiograms and getting 'subtraction' during selective catheterisation of carotid artery⁽¹⁵⁾. Seeger, Wood, Lukin and Carmody have expressed that a successful visualization of the angiography of internal carotid artery can present the mistakes of the treatment the patient has received^(8,16). Nov et al. have informed that in their study with 493 patients, there were three cases (0.6 %) receiving inappropriate treatments before their angiographic examinations⁽¹⁷⁾.

Foley et al. have applied the carotid endarterectomy to twenty-five patients of the eightysix cases having symptoms of cereb-

ral ischemia. According to the angiographic images carotid subclavian by-pass were constructed to a patient⁽¹⁸⁾.

In our study of twelve patients highly diagnostic angiographic inventions giving more additional information than CT were obtained. Two patients (case 2 and case 14) had been the candidates of neurosurgical intervention and case 14 who accepted the operation underwent superficial temporal middle cerebral artery by pass operation at Neurosurgery Clinic of Ankara Hospital. In case 20, a suspicious tumoral image were clarified. The demonstration of the presence of complete obstruction in seven cases could estimate the prognosis. The determination of the vasospasm in three cases, suggested the use of calcium channel blockers. The discussion of the results of the medical therapy administered to the patients in the highly diagnostic group were remained out of the study extent.

CONCLUSION

As a result, our study showed that the treatment ordered according to the conclusions of the CT of the patients having symptomatic cerebral ischemia can be rearranged. Certainly DSA is not the initial method in the diagnosis of cerebral infarctions. However, if it has been realized that the appearance of the complications of IADSA administered at experienced units is rare, it may be suggested as a method closer to optimum for determining the prognosis and giving the chance of surgery within the groups of selected cases. This study is trying to contribute to the opinion that there may be new perspectives in the diagnosis and treatment of patients with CT proven cerebral infarcts.

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