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DISSECTION OF THE CRANIOCERVICAL ARTERIES

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SUMMARY – Once considered rare, dissection of the internal carotid artery or vertebral artery is an increasingly recognized entity. Craniocervical arterial dissection is an uncommon cause of stroke in the general population, but is relatively common in patients below the age of 40. The early clinical manifestations are often subtle, however, permanent neurologic disability and death can result if the diagnosis is delayed. The present report describes eight patients (four men and four women) with dissection of the craniocervical arteries. Patient history was taken and clinical neurologic examinations were performed immediately upon admission. Diagnostic procedures included ultrasound (CDFI and TCD) and radiologic (computed tomography and digital subtraction angiography) examinations. The leading symptoms were focal neurologic deficits, and headache and neckache. Ultrasound findings (CDFI) were positive for vessel dissection in seven (87.5%) patients, and DSA was consistent with dissection in five (62.5%) patients and negative in one patient, whereas in two patients this examination was not performed due to the known allergy to contrast medium. Five (62.5%) patients were treated with anticoagulants, one with platelet aggregation suppressants, and two patients were operated on. Six (75.0%) patients showed partial post-therapeutic recovery of neurologic deficits and improvement of ultrasound findings of dissected arteries. One patient developed a stroke postoperatively, with deterioration of the motor deficit, and one patient was readmitted three months later for a newly developed stroke and died soon thereafter. It is concluded that early detection of craniocervical arterial dissection is important to minimize the morbidity and mortality associated with this condition.

Key words: *Carotid artery diseases, complications; Carotid artery diseases, diagnosis; Aneurysm – dissecting, etiology*

Introduction

Dissection of craniocervical arteries (carotid and vertebral) is an abrupt lesion of the arterial wall. Dissection of the arterial wall is induced by rupture of the vasa vasorum of the media, which leads to hemorrhage within the wall and separates its layers, or by primary lesion of the intima. If the process is progressing from the separated layers of the media towards the lumen, secondary stenosis or occlusion by thrombosis of the dissected segment of the vessel occurs. Further embolic accidents arising from a thrombotic vessel are also possible. A dissection progressing towards the adventitia results in an aneurysm of the wall with pending rupture. In the majority of cases, the cause and pathogenesis of dissection remain unknown.

Dissection of the craniocervical arteries is an infrequent cause of stroke (0.4% - 2.5%) in the general population, however, it is more common in younger age groups (5% - 20%) and in women[1-4].

Etiologically, craniocervical arterial dissection is generally classified as either spontaneous or traumatic (head and neck trauma with concomitant lesions of the arteries). Even some insignificant, 'trivial' trauma (e.g., coughing, sneezing, vomiting, excessive exercise, sudden rotation of the head and neck, awkward sleeping position, chiroprac-

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tic grips) may result in spontaneous arterial dissection.

According to localization, dissection of craniocervical arteries can be extracranial or intracranial.

The disorders most commonly predisposing to craniocervical arterial dissection are fibromuscular dysplasia, cystic medial necrosis, and Marfan's syndrome. An increased predisposition to dissection was observed in patients with a decreased level of alpha 1 antitrypsin. Some patients sustained repeated dissections, whereas in others familial predisposition was recorded. In one third of the patients, multiple dissections involving more than one artery were detected[1-11].

Common symptoms of dissection are sudden headache, neckache and focal neurologic signs[1]. Diagnostic procedures include ultrasound (CDFI – extracranial color Doppler, and TCD – transcranial Doppler sonography) and radiologic (DSA – digital subtraction angiography, MRI – magnetic resonance imaging, MRA – magnetic resonance angiography, CT – computed tomography) methods[12-18].

Treatment generally consists of anticoagulants or platelet aggregation suppressants. Operative therapy is occasionally performed[1].

Patients and Methods

Eight patients (four male and four female) aged 41-66 years with dissection of the craniocervical arteries (internal carotid and vertebral), admitted to the University Department of Neurology, Sestre milosrdnice University Hospital, Zagreb, between May 1998 and June 1999, are described (Fig. 1). Patient history was taken and clinical neurologic examinations were performed immediately upon admission. Diagnostic procedures included ultra-

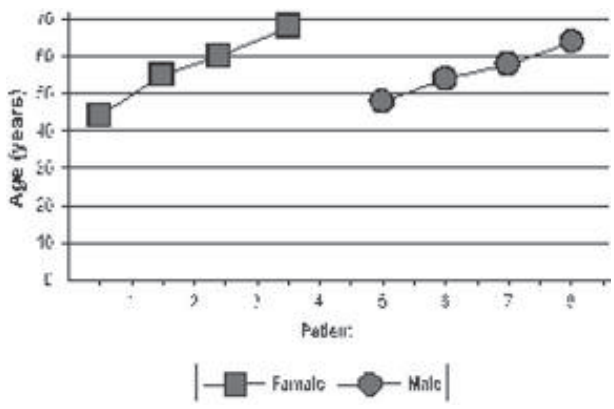

Fig. 1. Patient sex and age distribution

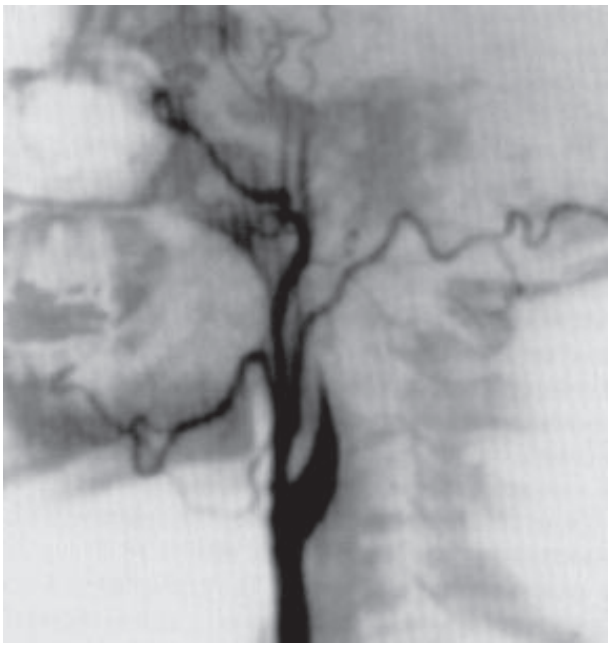

Fig. 2. Angiogram of an internal carotid artery dissection

sound (CDFI and TCD) and radiologic (CT and DSA) examinations (Figs. 2 and 3). Extracranial Doppler examination was performed on a real-time duplex ultrasound system (Acuson 128 XP) with a 7.5 MHz probe for morphological evaluation and 5 MHz probe for hemodynamic evaluation of craniocervical arteries. The extracranial carotid and vertebral arteries were visualized and blood flow velocities were recorded bilaterally. A pulsed-wave Doppler device operating at 2 MHz was used for all transcranial Doppler ultrasound examinations (TCD DWL Multi Dop L). The middle cerebral, anterior cerebral, posterior cerebral artery, and internal carotid artery bifurcation were analyzed at different depths by transtemporal approach, and intracranial vertebral artery and basilar artery through occipital foramen. DSA was performed by percutaneous femoral approach. CT examinations were performed with 5-mm imaging (Siemens). The risk factors, treatment and outcome of the disease were analyzed.

Results

Eight patients with dissection of the craniocervical (carotid and vertebral) arteries were evaluated. Spontaneous dissection was found in six, and posttraumatic dissection in two patients. The dissections involved internal carotid artery in four, and vertebral in two patients. One

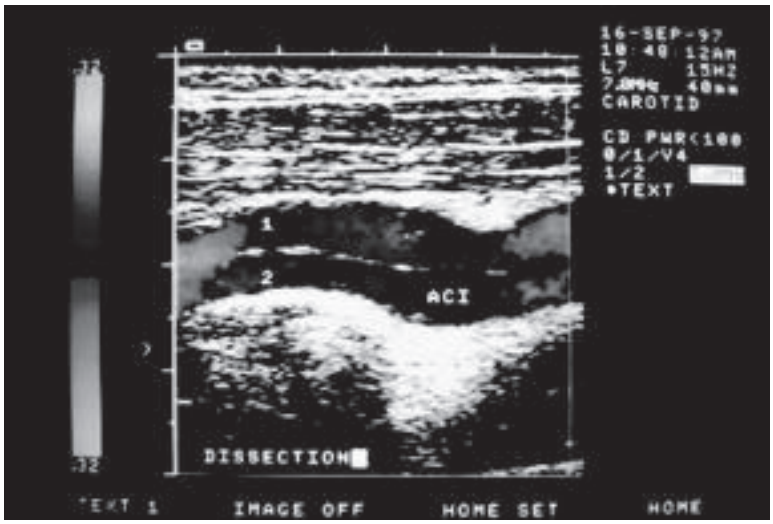

Fig. 3. Color Doppler flow imaging of an internal carotid artery dissection

patient had dissections of both internal carotid and vertebral arteries ipsilaterally, and another one had an intracranial aneurysm along with internal carotid artery dissection (Fig. 4). The leading symptoms were focal neurologic deficits, headache and neckache (Fig. 5). CDFI of carotid and vertebral arteries was positive for vessel dissection in seven and negative in only one patient. DSA was consistent with dissection in five and negative in one patient, whereas in two patients it was not performed because of the known allergy to the contrast medium. CT indicated ischemic lesions in five, subarachnoid hemorrhage in one and atrophy in one patient, whereas in one patient the CT finding was normal (Fig. 6). Concerning risk factors, hypertension was recorded in seven patients, hyperlipidemia and/or cardiac disease in three patients each, and diabetes mellitus and smoking in two patients each (Fig. 7). Two patients were operated on, five patients were treated with anticoagulants, and one with platelet aggregation suppressants (Fig. 8). Posttherapeutically, six patients (one operated on and five treated with anticoagulants) showed partial recovery of neurologic deficits, along with improvement of ultrasound findings of dissected arteries. In one patient, stroke and deterioration of motor deficit developed postoperatively. The last patient treated with platelet aggre-

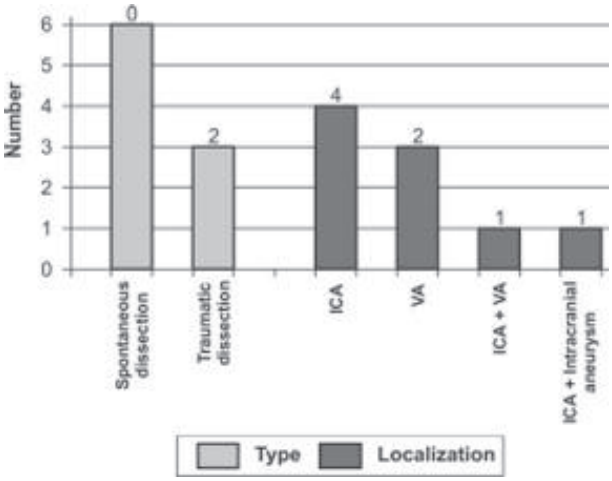

Fig. 4. Dissection type and localization

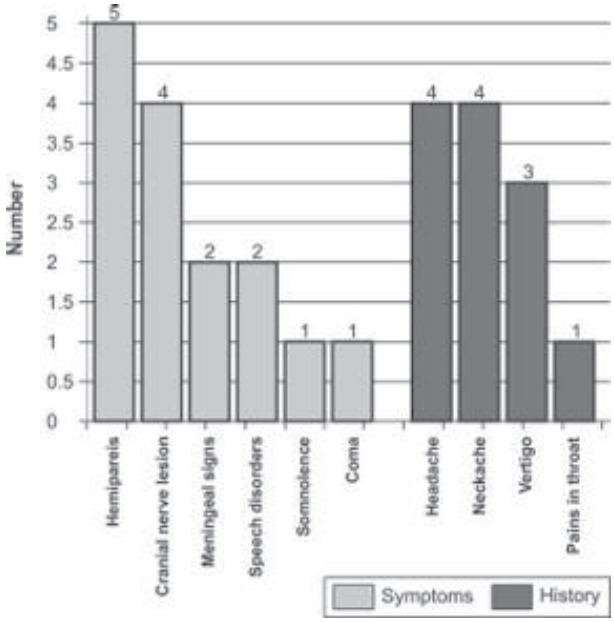

Fig. 5. Symptoms and history

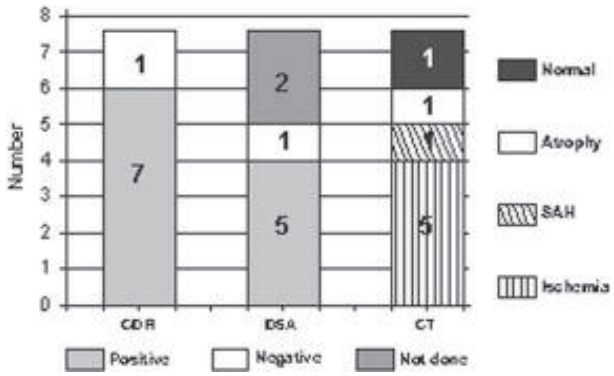

Fig. 6. Diagnostic workup

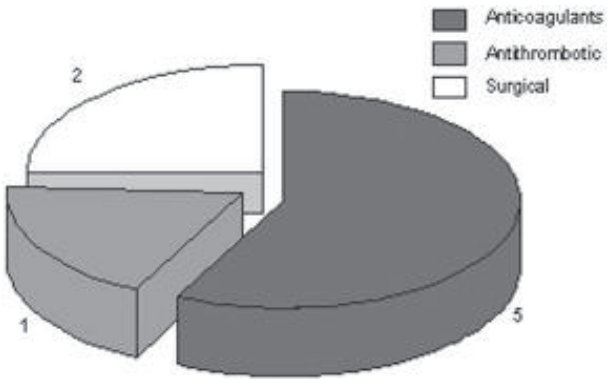

Fig. 8. Therapy

gation suppressants was readmitted three months later for recurrent stroke and died soon (Fig. 9).

Discussion and Conclusion

Dissection of the craniocervical arteries is an uncommon but important cause of stroke, especially in younger population. It is of utmost importance to recognize the disease by clinical examination, followed by noninvasive ultrasonographic and radiologic examinations to verify the clinical diagnosis. The entity should be suspected in young or middle-aged patients with a new onset of otherwise unexplained nonremitting headache or neckache, especially when associated with transient or permanent focal neurologic deficits. The risk factors should be minimized and anticoagulant therapy should be initiated as early as possible in order to decrease the risk of severe stroke and lethal outcome.

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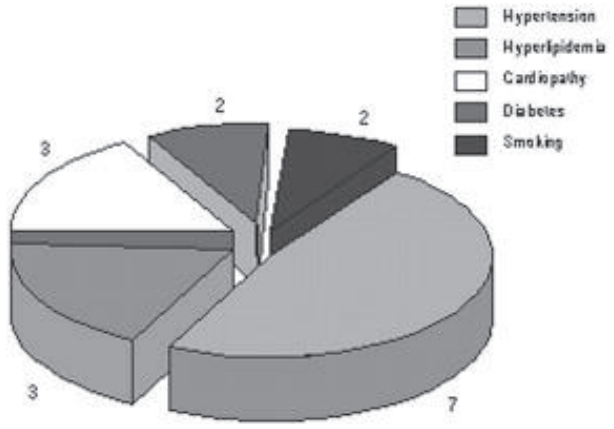

Fig. 7. Risk factors

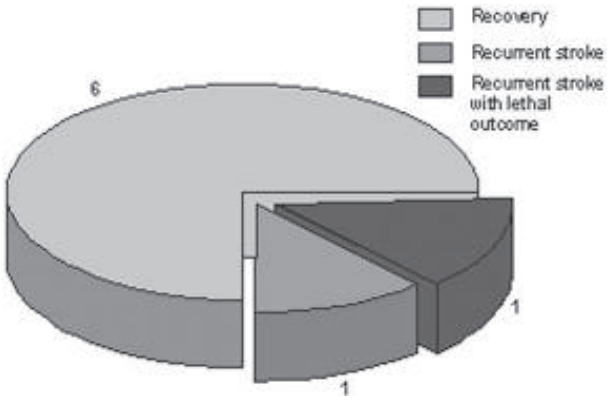

Fig. 9. Outcome

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Sažetak

DISEKCIJA KRANIOCERVIKALNIH ARTERIJA

M. Bošnjak-Pašić, V. Vargek-Solter, M. Uremović, B. Bošnjak, R Budić, D. Solter i V Demarin

Disekcija unutarnje karotidne ili vertebralne arterije je rijetka, ali sve češće prepoznata. Disekcija kraniocervikalnih arterija rijetko je uzrokom cerebrovask ularnog inzulta u općoj populaciji, ali je češća u bolesnika mlađe dobi, ispod 40 godina. Rane kliničk e manifestacije često su jedva zamjetljive, a u slučaju neprepoznate dijagnoze moguć je trajni neurološki deficit, pa i smrtni ishod. U studiju je bilo uključeno osmoro bolesnika (četiri žene i četiri muškarca) s disekcijom kraniocervikalnih arterija. Odmah nakon prijma uzeti su anamnestički podaci te je učinjen klinički neurološki pregled. Bolesnici su podvrgnuti dijagnostičkim metodama koje su uključivale ultrazvučne (CDFI i T CD) i radiološk e (CT i DSA) pretrage. V odeći simptomi bolesti bili su žarišni neurološki znakovi i naglo nastala glavobolja i bolovi u stražnjem dijelu vrata. U 7 (87,5%) slučajeva CDFI karotidnih i vertebralnih arterija pokazao je pozitivan nalaz disekcije žile. P etoro (62,5%) bolesnika je imalo pozitivan, a jedan bolesnik negativan nalaz DSA, dok u dvoje bolesnika ova pretraga nije provedena zbog alergije na kontrastno sredstvo. P etoro (62,5%) bolesnika liječeno je antikoagulantnom terapijom, jedan antiagregansima, a dvoje operacijski. U šestoro (75,0%) bolesnika je nakon primijenjene terapije došlo do djelomičnog kliničkog oporavka i poboljšanja ultrazvučnog nalaza na diseciranim krvnim žilama. Jedan je bolesnik nakon operacijskog zahvata doživio recidiv moždanog udara uz pogoršanje neurološkog deficita, a u jednom je slučaju nakon tri mjeseca nastupio recidiv moždanog udara sa smrtnim ishodom. Od velik e je važnosti rano prepoznati disekcije kraniocervikalnih arterija, kako bi se smanjio njihov pobol i smrtnost.

Ključne riječi: *Bolesti karotidne arterije, komplikacije; Bolesti karotidne arterije, dijagnostika; Aneurizma – disekcijska, etiologija*