Patients after handling of brain aneurysm should be submitted to increased care throughout the period of vaccination against COVID-19

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A- Conception and study design; B - Collection of data; C - Data analysis; D - Writing the paper; E - Review article; F - Approval of the final version of the article; G - Other (please specify)

ABSTRACT

Background: It is commonly believed that after successful clipping of unruptured cerebral aneurysms patients may be considered restored to normal life. Nonetheless, some 11% may develop stroke within a year of the procedure. Therefore the question arises as to whether this group of patients can be submitted to different medical procedures, including vaccination against COVID-19, which has been reported to incidentally elicit thromboembolic events, without the necessity of special precautions.

Case presentation: A contribution to this debate was presented in the case-history of a 56-year-old woman who underwent clipping of 3 unruptured cerebral aneurysms and in whom CT 8 months post-surgery did not show any abnormalities. Fourteen months post procedure she developed headache, vomiting and hand numbness coincidentally with ChAdOx1 nCoV-19 vaccination. CT revealed a small hypodense region within the territory of the right middle cerebral artery (MCA). CT angiography demonstrated a gap in contrast enhancement of the MCA and of the left anterior cerebral artery (ACA), exactly at the sites corresponding to localization of the aneurysm clips.

Conclusions: Following clipping of cerebral aneurysms, patients may be prone to developing stroke coincidental with anti-COVID-19 vaccination. They may require special care during the peri-vaccinate period.

Keywords: Cerebral aneurysm, surgical clipping, COVID-19 vaccination, thromboembolism, cerebral stroke.

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Received: 17.01.2022
Accepted: 24.03.2022
Progress in Health Sciences
Vol. 12(1) 2022 pp 110-113
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INTRODUCTION

The advent of anti-COVID-19 vaccines marked a turning point during the global pandemic, providing a powerful tool for overcoming social fear and problems with the re-organization of the economy and health service systems. Post-vaccine complications are rare and thus deemed acceptable in view of the undisputed rewards of vaccination. Nevertheless, they cannot be taken lightly because of the vast social resonance they evoke.

In recent months, the literature has highlighted six individual cases of ischemic stroke coincidental with vaccination [1-3]. It is of utmost importance to identify factors that may predispose for serious complications, some of which may stem from the patient’s past medical history. We wish to contribute to this issue with an instructive case of mild ischemic stroke which occurred coincidentally with ChAdOx1 nCoV-19 vaccination in a patient who had undergone uneventful clipping of 3 unruptured cerebral aneurysms, a year before vaccination. Of particular interest is the fact that the suspected site of occlusion of the two cerebral arteries exactly corresponded to the localization of the aneurysm clips.

CASE PRESENTATION

A 56-year-old woman had undergone clipping of three unruptured intracranial aneurysms in March 2020. During this hospitalization the patient reported smoking cigarettes, her BMI was 20.3, and her past history was free of any chronic illness except mild arterial hypertension with a normal echocardiogram. All of unruptured aneurysms presented during the surgical procedure as thin and red-walled, thus giving the appearance of being “angry to rupture”. The biggest, 8 mm in diameter, was located at the bifurcation of the middle cerebral artery (MCA), and adjacent to its dome there was the dome of another, 2.5 mm aneurysm arising from the upper branch of MCA. After separation of both domes there appeared a red, thin spot on the wall of the artery. For this reason, after successful clipping of both aneurysms, the complex of MCA branching was wrapped with Tachosil® in order to seal and strengthen this “aneurysm-bearing” region of the artery.

The third aneurysm, secured during the same procedure, was 5 mm in diameter, located at the A2 segment of the anterior cerebral artery (ACA), just next to the anterior communicating artery (Fig. A). No temporal clipping of any parent artery was revealed necessary. In the context of future events, it must be mentioned here, that in our institution the patency of both maternal vessel and its distal branches beyond the applied clip is routinely checked intraoperatively with Doppler probe following the strictly observed criterion that the amplitude of the tone must not differ before and after clip application.

Figures: A. Aneurysms located at the A2 segment of the left ACA and bifurcation of the right MCA. B. Post-operative follow-up (8 months later). C. Region of cerebral stroke (few days after second dose of ChAdOx1 nCov-19 vaccination). D. Gap in contrast enhancement of both MCA and ACA at the corresponding localization of the aneurysm' clips
The set of basic laboratory examinations remained within normal limits. Her postoperative course was uneventful. She was discharged 7 days after the procedure and was free of any symptoms during the next months. Eight months post-operatively follow-up computed tomography (CT) imaging revealed no abnormalities within the brain (Fig. B).

She avoided COVID-19 infection during the pandemic, thus on April 9th, 2021, she received the first dose of the ChAdOx1 nCoV-19 vaccination. After a couple of days, she suffered some headache, dizziness, and mild dyspnea. She considered these symptoms as mild, undesirable effects of the vaccine and did not seek medical consultation. She had the second vaccination following the generally recommended interval of 7 weeks (25th June 2021). Eight days after this vaccination she again experienced headache, this time accompanied by gentle numbness of the left hand and incidental morning vomiting. The symptoms again subsided within days, leaving only persistent headache. Only for this reason she visited a local OPD neurologist who ordered CT with angiography (angio-CT). This examination was performed on 17th July and revealed a gap in contrast enhancement of both right MCA and left ACA, exactly at the sites corresponding to localization of the aneurysms clips (Fig. D). Interestingly, peripheral circulation in both vessels was preserved. Nevertheless, imaging also demonstrated a hypodense region (2.3 x 1.5 x 1.7 cm), localized within the temporal tip and adjacent basal region of the frontal lobe – a picture clearly indicating a history of constrained cerebral stroke (Fig. C).

The patient was referred to our neurosurgical department at the end of July “for consultation”. She presented in good general condition, with no complaints/no neurological deficits, being fully conscious and aware. Comprehensive neuropsychological examination was performed by an experienced clinical psychologist (B.P.) and did not reveal any significant abnormalities in cognitive functioning. The status of cerebral vasculature was then checked at the end of August with MR angiography and revealed the still existing occlusion of both cardinal cerebral vessels.

DISCUSSION

The main bulk of known complications after anti-COVID-19 vaccines pertain to intravascular thrombosis in different organs. In the brain, most of the hitherto reported sequelae pertain to thrombosis of the venous sinuses [4-5] but single cases of MCA thrombosis have also recently been reported [1-3]. Due to the increased risk of thrombosis, the vaccination is not recommended in certain groups of patients, such as those suffering from thrombosis with thrombocytopenia syndrome (TTS). In other situations (e.g. heparin-induced thrombocytopenia and thrombosis) special protocols have been developed to protect against an increased risk of complications. Generally, it is stressed that healthcare professionals should be alert to early signs and symptoms of thrombo-embolism and patient should be actively investigated for signs of thrombosis.

From the perspective of the neurosurgeon, patients in whom an unruptured cerebral aneurysm has been successfully and uneventfully secured, re-join the “statistically normal” population; thus they allegedly do not require any special precautions during the management of future medical problems. By default, this notion has also been applied to vaccinations, including those prophylactic against COVID-19. In contrast to this current belief is the fact that as many as 11% of 1917 patients developed cerebral stroke within one year after seemingly successful clipping of unruptured aneurysms [6].

We would like to draw attention to the fact that patients who have undergone clipping of intracranial aneurysms may be particularly prone to developing thrombotic complications after a dose of COVID-19 vaccine. The allegedly “trivial” post-vaccination ailments of our patient turned out to be symptoms of serious brain ischemia. She did not seek medical advice either before or during the whole peri-vaccination period. Thanks to very efficient collateral circulation, the compromise of blood flow in the MCA and ACA merely caused a circumscribed brain infarct.

On the basis of just one case it is somewhat premature to propose defining a new risk group in respect of COVID-19 vaccination. Nevertheless, it seems reasonable to suggest that these patients deserve more attention during their peri-vaccination period. In particular, patients should be informed of the increased risk of stroke being potentiated by COVID-19 vaccination and made aware of potential symptoms, thereby alerting them to present for immediate medical care should they arise. It remains an open question as to whether guidelines ought to be implemented with regard to active antithrombotic prophylaxis with low-molecule heparin. In any event, the neurosurgeon or neurologist, who is often consulted about the vaccination, should be aware of possible risks for a patient formerly operated on, due to a cerebral aneurysm. Primary care physicians must in turn be alert to even slight, unspecific complaints reported by the patient and proceed early to more aggressive forms of treatment.

It seems that “the lesson to learn” from our case is self-evident considering the strict coincidence in time between the occurrence of brain ischemia syndrome and vaccination against COVID-19. Nevertheless, we cannot offer any persuasive rationale as to why the flow both in the MCA and in the ACA was compromised exactly at the site of the
clipped aneurysms. It is beyond any doubt that the vessels had not been constricted during aneurysm surgery. The procedure was performed by a neurosurgeon with 30 years of experience in cerebral vascular surgery (senior author - Z.M.) and the patency of the vessels was checked with intraoperative Doppler examination. The patient was both neurologically and psychologically intact long-term postoperatively and CT performed 8 months after the procedure was quite normal.

In spite of the above, we would not like to rigidly maintain that the vessels were fully patent long after the procedure. One consecutive series of 597 cases demonstrated angiographic vessel occlusion in 5.7% of patients, but it resulted in stroke in only half of them [7]. Therefore, a degree of vessel narrowing could exist before the incident, i.e. due to slow slippage of clips along the aneurysm neck, thus paving the way for development of collateral circulation. On the other hand, even with neutral clip position, the site of the clipped aneurysm is by no means a normal vessel wall and can serve as the “locus minoris resistentiae” for thrombus formation.

CONCLUSIONS

Patients who underwent clipping of cerebral aneurysm may be particularly prone to develop stroke coincidental with anti-COVID-19 vaccination.

Although on the basis of a single case, it is too early to propose that these patients require a special protocol for vaccination, it seems reasonable to submit them to increased care during the whole peri-vaccination period.

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Conflict of interest

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES