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Case Report

Massive Subgaleal Hematoma in a 62-Year-Old Man Treated with Apixaban as a Consequence of Mild Head Trauma

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Abstract

Subgaleal hematoma, accumulation of blood in the loose areolar tissue of the subgaleal space of the skull, is considered the most catastrophic complication of instrumental delivery. It is a rare finding in older ages, usually associated with coagulation disorders, severe head trauma leading to skull base fractures and accidental or abusive hair pulling. Complications include periorbital necrotising fasciitis, permanent blindness, infections and, in extreme rare cases, airway obstruction. Most cases of subgaleal hematoma resolve spontaneously, without the need of aspiration or drainage.

We present here the case of a 62-year-old male on anticoagulant therapy with apixaban for chronic atrial fibrillation, who came to the emergency department after a car accident suffering from mild head trauma. The patient was complaining of a diffuse headache and physical examination showed a large ecchymosis and edema on the frontal area of the head. His neurological examination was unremarkable. Full-body computed tomography (CT) revealed a fracture of the third right rib. Twelve hours after admission, due to an excessive decrease of hematocrit, a second CT was performed. Although the images didn't show intracranial hemorrhage or skull base fractures, a large and diffuse hematoma of the subaponeurotic space was observed and the diagnosis of subgaleal hematoma was confirmed.

Massive subgaleal hematoma after mild head trauma is rather infrequent. Early diagnosis improves outcomes and can avert serious complications. Therapeutic strategy should be based on the severity of each case. In our case, conservative treatment appeared to be a valid alternative to surgery, as hematoma resolved spontaneously within 10 days. It is noteworthy that the use of anticoagulation is the only evident factor that could have been the precipitating factor for the development of the hematoma in our patient.

Keywords

apixaban, massive subgaleal hematoma, mild head trauma

INTRODUCTION

Subgaleal hematoma is a life-threatening condition characterized by the accumulation of blood in the space between the pericranium and the galea aponeurotica of the skull by the rupture of the emissary veins, connecting the extracranial venous system with the intracranial venous sinuses.[1-3]

In the vast majority of cases, it is observed in newborns more frequently as a catastrophic complication of instrumental delivery. On the contrary, it is an extremely rare

entity in the adult population and usually associated with severe head trauma and skull base fractures, coagulation disorders and traumatic or abusive hair pulling.[1,3-5]

In our case, a 62-year-old man receiving treatment with apixaban developed a massive subgaleal hemorrhage expanded to the orbital and neck subcutaneous tissue, several hours following blunt head trauma. To our knowledge, this is the first case of massive subgaleal hematoma in a patient after mild head trauma with no other concomitant bleeding risk factors than the anticoagulant treatment with apixaban.

CASE REPORT

A 62-year-old male was admitted to the emergency department after a car accident. At admission, he was mentally alert, not confused, and well-oriented in time and space (Glasgow Coma Scale: 15/15). The patient was hemodynamically stable and his vital signs (blood pressure, heart rate, respiratory rate, body temperature, and oxygen saturation) were all within normal limits.

His past medical history included hypertension and chronic atrial fibrillation treated with apixaban (2.5 mg twice-daily). Family history for coagulation disorders was negative.

The patient presented with a large ecchymosis and edema on the frontal area of his head and a large ecchymosis on the right chest and he was complaining of a diffuse and constant headache.

Laboratory exams at admission were not specific with a hemoglobin of 15 g/dL, hematocrit of 44%, white cells of 17×10^9/L, platelet count of 260.000/mm^3, prothrombin time of 18.7, INR of 1.58, fibrinogen of 460 mg/dL and d-dimer of 6000 ng/ml.

Full-body computed tomography scan (CT) didn't show any pathology other than a fracture of the third right rib with no associated haemothorax, pneumothorax, or thoracoabdominal visceral injury.

On admission, the oral anticoagulation therapy was suspended and during hospitalization the patient remained stable without deterioration of his general condition. Several hours after his admission, the patient developed diffuse edema of the head and neck associated with edema and ecchymosis of the eyelids (raccoon eyes) and concomitant mastoid ecchymosis (Battle's sign).

Blood exams revealed an excessive decrease of hematocrit and hemoglobin levels (from 44 to 34% and from 15 to 11 g/dL respectively), without concomitant deterioration of his vital signs.

*On suspicion of severe hemorrhage, a second full-body CT scan was performed 12 hours after the patient's admission. Although the imaging studies did not detect any intracranial hemorrhage or skull base fractures, a large and diffuse hematoma (diffuse low density area) of the subaponeurotic space was observed and diagnosis of massive subgaleal hematoma was confirmed **(Figs 1-3)**.*

In our case, conservative treatment with compression bandage was the treatment of choice. Head, neck, and eyelids edema was resolved gradually within 10 days from his admission and a two-month follow-up didn't show any reaccumulation of blood or other complication.

DISCUSSION

The scalp is composed of five tissue layers consisting, from superficial to deep, of the overlying skin, dense connective tissue, the epicranial aponeurosis or galea aponeurotica, the subgaleal space occupied by the loose areolar tissue and the periosteum.[1,6,7]

The subgaleal space is of major clinical significance because many emissary veins pass through this areolar

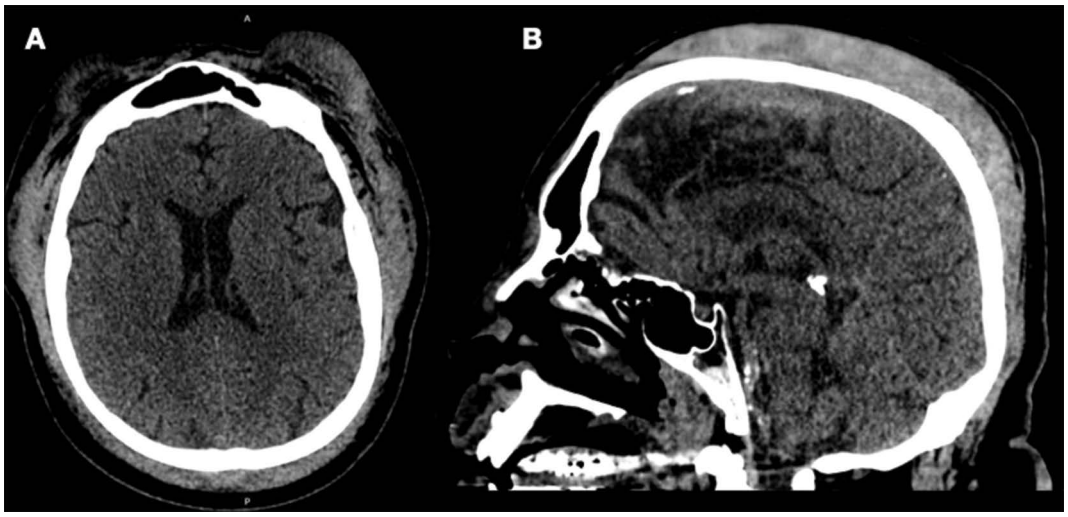

Figure 1. Head computed tomography (CT) showing extensive subgaleal hematoma (hyperattenuating content) in axial **(A)** and sagittal **(B)** planes, associated with soft tissues edema in adjacent face but without intraparenchymal or subcortical contusion or associated with skull fractures.

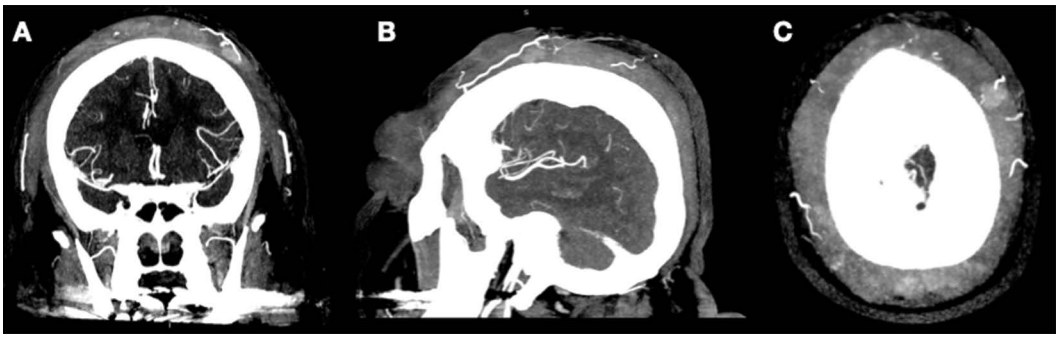

Figure 2. Maximum Intensity Projection CT scan demonstrating emissary and scalp veins with active bleeding in coronal **(A)**, sagittal **(B)** and axial **(C)** view.

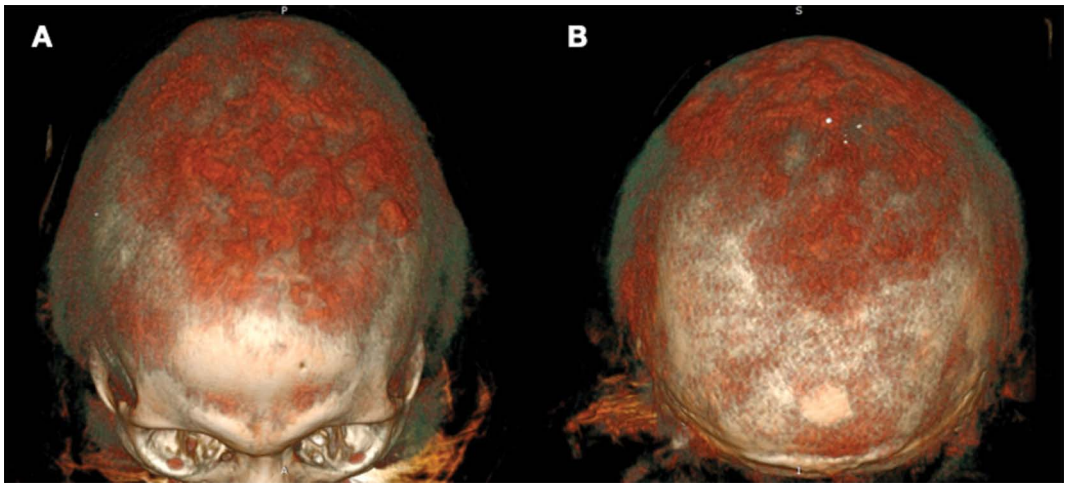

Figure 3. Volume Rendering 3-dimensional CT scan showing extensive subgaleal hematoma in anterior **(A)** and posterior **(B)** view.

tissue layer which communicates superficial scalp veins with intracranial venous sinuses. Importantly, this layer is poorly vascularized, increasing the risk of infection. The same infection can spread through the emissary veins to the intracranial venous sinuses and cause venous sinus thrombosis. Secondly, after blunt head trauma, these veins can bleed and/or cause subgaleal hematoma.[1,2,4-7]

Subgaleal hematoma refers to hemorrhage in the space between the galea aponeurotica and the periosteum. There are normal anatomic boundaries that limit the spread of pathological processes, such as infections or hematomas, from the scalp to the neck. The occipitalis muscle, which arises from the superior nuchal line of the occipital bone and the mastoid process of the temporal bone and ends in the epicranial aponeurosis, limits the spread of hemorrhage posteriorly. The attachment of the superficial temporal fascia to the zygomatic arch limits the spread of hemorrhage anteriorly. Although there are cases in which a large hematoma under pressure may transgress these normal anatomic boundaries and may spread beneath the entire scalp and even dissect into the subcutaneous tissue of the neck and cause diffuse facial and neck edema such as in our case, and, in extremely rare cases, airway obstruction and emergency tracheostomy.[1,4,6,7] On the other hand, the frontalis muscle attaches only to the skin and subcutaneous tissue anteriorly and not to the frontal bone. As a result, there is no muscle attachment limiting the anterior spread of hematoma. The blood can extend anteriorly under the frontalis muscle and spread around the loose connective tissue of the eyelid and cause typically periorbital ecchymosis known as raccoon eyes. Ting et al. described a rare case of periorbital necrotising fascitis resulting from extension of the subgaleal hematoma into the preseptal region and characterised by rapidly progressing necrotising infection and overlying cutaneous gangrene.[7] Permanent blindness is an uncommon complication of massive subgaleal hematoma resulting from the extension of the haemorrhage into the orbital subperiosteal space and consequent increased intraocular pressure and severe optical nerve neuropathy.[8]

In most cases, subgaleal hematoma is seen at the neonatal period, especially in newborns, as a catastrophic complication of instrumental delivery (difficult and prolonged vacuum extraction or use of forceps).[5] The incidence has been estimated approximately to be 0.4 in 1000 spontaneous vaginal deliveries and 5 in 1000 vacuum-assisted deliveries and is associated with significant morbidity and mortality rates due to hypovolemic shock.[5] Differential diagnosis

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includes cephalohematoma and caput succedaneum.[4]

Its occurrence, except in the neonatal period, is extremely unusual and frequently associated with severe head trauma and skull base fractures involving tangential and radial forces to the head. In some rare reported cases, subgaleal hematoma has been described as a direct consequence of hair pulling.[3]

Blood disorders like dysfibrinogenemia, sickle cell disease, hemophilia, factor XIII deficiency, von Willerbrand disease, idiopathic thrombocytopenic purpura and vitamin K deficiency have been reported in cases of subgaleal hematoma after mild head trauma.[9-13]

Oral anticoagulant therapy reduces the risk of thromboembolic events and prevent an ischemic stroke in patients with atrial fibrillation but is also associated with hemorrhagic complications.[14]

Management of a patient with subgaleal hematoma should be focused on the possible origin, patients' health conditions, and clinician's choice. Most cases of subgaleal hematoma resolves spontaneously without the need of aspiration or drainage.[1,15] In our case, the patient remained hemodynamically stable and conservative treatment with pressure bandage was the most appropriate treatment option. There are no well-established protocols for the management of subgaleal hematomas. Patients with recur ent hematoma are preferred to be treated with endovascular embolization.[15] In some cases, more invasive procedures, such as aspiration or drainage, are needed, especially for large and complicated subgaleal hematomas, in order to minimize the period of blood resorption, risk of infection, calcification and reaccumulation.[2,3]

CONCLUSIONS

Massive subgaleal hematoma with diffuse swelling of head, neck, and eyelids following mild head trauma is rather infrequent. Early identification is essential to prevent complication and improve general outcomes. Treatment algorithm is not well-established yet. In most cases, conservative treatment gives good results. In complex cases, more invasive procedures are needed, such as aspiration, drainage or endovascular treatment. In a patient without other risk factors for hemorrhagic event, apixaban may be the cause for this massive hematoma after a mild head trauma.

Disclosure

The authors have nothing to disclose.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Массивная субгалеальная гематома у 62-летнего мужчины, принимавшего апиксабан в качестве лекарственного средства после лёгкой травмы головы

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Резюме

Подпалеальная гематома – скопление крови в рыхлой ареолярной ткани подпалеального пространства черепа – считается наиболее серьёзным осложнением при инструментальном вмешательстве. Это редкая находка у пожилых людей и обычно связана с нарушениями свёртывания крови, тяжёлой травмой головы, приводящей к переломам у основания черепа, а также случайным или сильным выдёргиванием волос. Осложнения включают периорбитальный некротический фасциит, стойкую слепоту, инфекции и, в очень редких случаях, обструкцию дыхательных путей. Большинство случаев подгалемической гематомы разрешается спонтанно без необходимости аспирации или дренажа.

Здесь мы представляем случай 62-летнего мужчины, проходящего антикоагулянтную терапию апиксабаном по поводу хронической фибрилляции предсердий, который обращался в отделение неотложной помощи после автомобильной аварии с незначительной травмой головы. Пациент пожаловался на диффузную головную боль, а при физикальном обследовании выявили большой экхимоз и отёк лобной области головы. Неврологическое обследование патологий не выявило. Компьютерная томография (КТ) всего тела выявила перелом третьего ребра. Через двенадцать часов после госпитализации была проведена вторая компьютерная томография из-за чрезмерного гематокрита. Хотя изображения не показали внутричерепного кровоизлияния и перелома основания черепа, наблюдалась большая диффузная гематома субапоневротического пространства, и диагноз субпалеальной гематомы был подтверждён. Массивная подгареальная гематома после лёгкой травмы головы – относительно редкая находка. Ранняя диагностика улучшает исход и помогает избежать серьёзных осложнений. Терапевтическая стратегия должна основываться на тяжести каждого случая. В нашем случае консервативное лечение оказалось хорошей альтернативой хирургическому вмешательству, поскольку гематома исчезла самопроизвольно в течение 10 дней. Следует отметить, что использование антикоагулянтов – единственный очевидный фактор, который мог вызвать развитие гематомы у нашего пациента.

Ключевые слова

апиксабан, массивная подгалеальная гематома, лёгкая травма головы