

Fibrinolytic activity in bacterial strains found in patients with epistaxis

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SUMMARY

Bacterial isolation from the nose and throat was performed in 150 patients with epistaxis. Fibrinolytically active bacterial strains were found in the nose of 13 patients. The duration of the nose bleeding was significantly longer in these patients than in the other patients. The fibrinolytically active bacterial strains which were found might thus be an alternative explanation of repeated nose bleedings.

MANY patients with epistaxis have experienced that the nose bleeding starts again some hours to some days after it has been arrested. These secondary released nose bleedings might be explained by movements of the clot (due to sneezing, breathing throw the nose and nose blowing) or clot dissolution.

The dissolution of blood clots is called fibrinolysis. In the clot plasminogen is incorporated. The plasminogen can be activated by different activators to plasmin which breaks down the fibrin network in the clot.

The activators staphylokinase and streptokinase are produced by certain bacterial strains of staphylococcus aureus and beta-hemolytic streptococci. Bacterial strains with fibrinolytic activity isolated from the nose in patients with recurrent epistaxis might be an alternative explanation of repeated nose bleedings.

CLINICAL MATERIAL

The patients in this study constituted 91 patients hospitalized due to epistaxis and 59 out patients. Only 5 patients were less than 20 years old.

From all patients samples for bacterial isolation were taken from the nose and throat before the patients were treated and 2 to 4 weeks later. When bleeding the nose sample was taken from the posterior parts of the middle meatus on the side opposite to the bleeding.

METHODS

Bacterial isolation and determination of fibrinolytic activity was performed according to Petruson (1974).

The fibrinolytic activity in the patients strains was compared with a well known streptokinase producing strain (H 64) which is used for production of the commercial drug Kabikinase. Strains H 64 had a streptokinase activity equal to 200 units streptokinase per ml.

The fibrinolytic activity of the different patients bacterial strains was classified as shown in table 1.

Table 1. Classification of the fibrinolytic activity

| | |
|------|---|
| + | = fibrinolytic activity demonstrable |
| ++ | = fibrinolytic activity less than reference strain H 64 |
| +++ | = fibrinolytic activity equal to the reference strain H 64 |
| ++++ | = fibrinolytic activity stronger than the reference strain H 64 |

RESULTS

From 45 patients strains of staphylococcus aureus or beta hemolytic streptococci were isolated when the patients bled (table 2). After two to four weeks strains of staphylococcus aureus or beta hemolytic streptococci were isolated from 22 patients.

In all 62 strains of staphylococcus aureus and 11 strains of beta hemolytic streptococci were isolated. The fibrinolytic activity in these 73 strains were tested. It was found that 13 patients had strains that were fibrinolytically active. In 8 of these patients the fibrinolytic activity in the isolated strains was equal or higher than 200 units streptokinase per ml. (table 3).

Table 2. Number of patients with bacterial strains of staphylococcus aureus (st.a.) and beta hemolytic streptococci (h.str.)

| | st.a. | h.str. | st.a. + h.str. | Number of patients with one or more strain |
|-------------------------|-------|--------|----------------|--|
| Only when the pat. bled | 29 | 2 | 2 | 33 |
| Only some weeks later | 9 | 1 | 0 | 10 |
| On both occasions | 9 | 1 | 2 | 12 |

Table 3. Number of patients with fibrinolytically active bacterial strains

| | st.a. with activity | | | | h.str. with activity | | | |
|-------------------------|---------------------|----|-----|------|----------------------|----|-----|------|
| | + | ++ | +++ | ++++ | + | ++ | +++ | ++++ |
| Only when the pat. bled | 2 | 0 | 3 | 2 | 2 | 1 | 1 | 0 |
| Only some weeks later | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On both occasions | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

The duration of the nose bleeding was noted in all patients. It was found that the patients who had had a fibrinolytically active bacterial strain had bled significantly longer ($p < 0.05$) than the other patients (table 4).

Table 4. The duration of the nose bleeding correlated to the occurrence of fibrinolytically active bacterial strains (f.a.b.s.)

| | Duration of the nose bleeding | |
|---------------------------|-------------------------------|----------|
| | ≤ 24 h | > 24 h |
| Patients with f.a.b.s. | 4 | 9 |
| Patients without f.a.b.s. | 81 | 56 |

DISCUSSION

Recurrent epistaxis might either be explained by mechanical influences of the blood clot or dissolution of the blood clot.

The blood clots are dissolved by fibrinolysis. It has been shown by Petruson (1974) that the fibrinolytic activity in the blood and the nasal mucosa is significantly higher in nose bleeding patients when they bleed than some weeks later. It has also been shown (Petruson, 1974) that fibrinolytically active bacterial strains can be isolated from patients with epistaxis.

In this study which is an extension of the previous mentioned study the duration of the nose bleeding was correlated to the occurrence of fibrinolytically active bacterial strains. It was observed that patients with fibrinolytically active bacterial strains had bled more than 24 hours in a significantly higher frequency than the other patients. It was thus more common with fibrinolytically active bacterial strains in patients who had recurrent nose bleedings of long duration.

The bacterial strains in the nose of nose bleeding patients either existed in the nose before the bleeding started or were introduced in the nose afterwards with for example a finger or a piece of cotton. When a blood clot is present in the nose the growth conditions of the bacteria are excellent and one might expect a rapid multiplication.

In 8 of the 13 patients the bacterial strains produced enzymes with a very high fibrinolytic activity. A high production of streptokinase or staphylokinase results in a rapid dissolution of the formed blood clots in the ruptured nasal vessels and recurrent nose bleedings.

Recurrent nose bleedings can be inhibited with antifibrinolytic drugs for example tranexamic acid (Cyklokapron[®]) (Petruson, 1974).

ZUSAMMENFASSUNG

Isolierung der Bakterienflora von Nase und Rachen ist an 150 Patienten mit Nasenblutung vorgenommen worden. Fibrinolytisch aktive Bakterienstämme ent-

deckte man in der Nase von 13 Patienten. Die Dauer der Nasenblutung war bei den letztgenannten Patienten erheblich länger als diejenige der übrigen Patienten. Die isolierten fibrinolytischen Bakterienstämme können dementsprechend eine alternative Erklärung für häufig vorkommende Nasenblutungen sein.

REFERENCES

Petruson, B., 1974: Epistaxis a clinical study with special reference to fibrinolysis. Acta otolaryng., Suppl. 317.

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