

Reconstruction of intraoral bone defects using the stabilised autologous blood coagulum after SCHULTE. A 10-year experience

Language: English

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Date/Event/Venue:

03.09.-07.09.2002
Congress of the European Association of Craniomaxillofacial Surgeon
Muenster, Germany

Introduction

Bony defects such as those caused typically by cysts are part of the frequent disorders of the stomatognathic system. The majority of jaw cysts derive from the tissue of the tooth bud and remain unnoticed clinically for a long time. They show a slow, expansive growth, displacing anatomical neighbouring structures. Their removal is indicated before they cause or encourage damage (resorptions, secondary fractures, infections) (Neukam 1995).

A cystectomy (Parsch II) removes the cyst sac completely and the resulting cavity is initially sealed. Where cavities are larger than the size of a cherry (> 2cm), there is a risk of wound infection, on account of the retraction of the blood coagulum, which would lead to secondary treatment. In the 1960's Schulte therefore suggested stabilising the blood coagulum with a denatured gelatine sponge and oral peri-operative antibiotic prophylactic treatment (1960, 1964, 1965). For bigger cavities Schulte (1969) used the cellular blood constituents after centrifugation.

The developments of recent years, e.g. Platelet-Rich-Plasma (PRP), have finally put the physiological qualities of the blood and, therefore, the biological factors in bone regeneration, in central place again (Marx et al., 1998).

Objectives

The aim of this study was to investigate clinical experiences with stabilised autologous venous blood coagulum after SCHULTE, over a 10-year period.

Material and Methods

In a retrospective study the medical files of 175 in-patients were assessed, who, between 01.01.1990 - 31.12.1999, had bone defects filled with stabilised venous blood coagulum after SCHULTE. In total, 187 osseous cavities, left after the removal of cysts, were filled using this method.

Following the recommendations of Schulte (1960), venous blood of the patient, taken from an arm vein during the operation, was mixed in a metal bowl with denatured gelatine sponge (Gelaspon®, Chauvin Ankerpharm GmbH, Rudolstadt, Germany) (Fig.1).

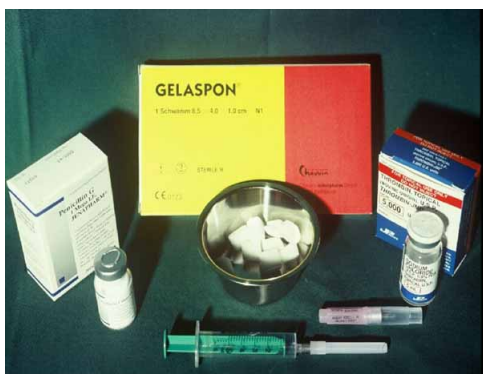


Fig.1
Ingredients of the SCHULTE coagulum.

Penicillin G in a dose of at least 10000 IU/ml, this mostly being the total contents of the packet (1 million IU), is subsequently added to this mixture. Coagulation, limited by the administration of antibiotics, is speeded up again with thrombin powder (Thrombin-JMI®, Gen Trac Incorporated, Middleton, Wisconsin, USA) (Fig. 2).



Fig. 2:
mixed SCHULTE coagulum.

Following Schulte's recommendation (1960) thrombin was added until the coagulation was visible. When the paste has been thoroughly mixed it is applied to the cavity without pressure using a suitable instrument (Fig 3).

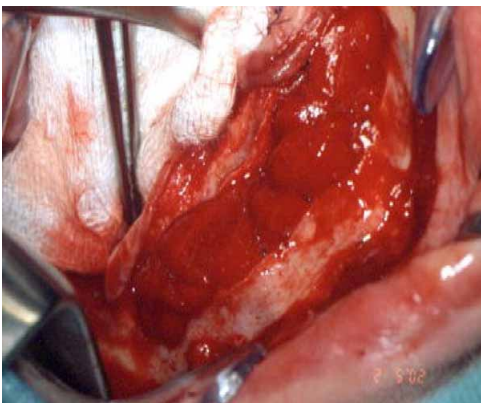


Fig. 3:
Application of the SCHULTE coagulum in a bony defect of the mandible after cystectomy.



Fig. 4:
in toto removed cyst.

While doing so attention should be paid to keeping the saliva contamination of the lumen as small as possible after the total removal of the cyst sac. Following primary suture, post-operatively, antibiotic prophylactic treatment with a penicillin preparation was carried out, mostly for a few days, to avoid resistance developing through the relatively small antibiotics concentration issuing from the coagulum.

Out of 175 in-patients with enlarged cysts, following cystectomy (n=187) there was a defective filling with the SCHULTE coagulum. The dimensions of each cyst were measured on the calibrated orthopantogramme. Postoperative infection rates and nerve function impairments were analysed retrospectively, and reossification was assessed by X-Ray.

Results

Histologically 53% of the cases (99) were follicle cysts, 20% (40) were radical cysts, 19% (36) were residual cysts and twelve (6%) were other osseous lesions (Fig. 3 and 5 a to c).



Fig. 5a:
Extended histologically proven odontogenic cyst of the mandible. After cystectomy the osseous lesion was filled by SCHULTE coagulum.



Fig. 5b:
Radiological finding after 6 month.



Fig. 5c:
Radiological finding after 12 month.

Only 10 of the 187 operation wounds (5.2%) resulted in a serious infection, necessitating additional surgical post-operative treatment. 11 patients with a mild post-operative infection did not require any additional measures. No patients had side effects caused by the operation (nerve function impairments, amongst others). Equally, no pathological fractures were observed. In doing this, a connection between the dimensions of the cyst and the occurrence of wound closure impairments could be found. Under X-Ray real reossification was found in 159 patients, recorded within the framework of routine follow-up tests including X-Ray tests (after 6 months at the earliest).

Fig. 5a to c show, as an example, the reossification of an enlarged cyst in the lower jaw after the filling of a crater with SCHULTE coagulum.

Conclusions

Based on the results of the present study it can be summarised that the stabilised venous blood coagulum after SCHULTE can be recommended, now as before, as a low risk, easy to implement, and not least, as a reasonably priced method for the autologous regeneration of the bone in medium to larger (> 2 cm) bone craters and renders alternative procedures, at least for alveolar process defects, superfluous.

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Fig. 1: Ingredients of the SCHULTE coagulum



Fig. 2: Mixed SCHULTE coagulum



Fig. 3: Application of the SCHULTE coagulum in a bony defect of the mandible after cystectomy

Introduction:

Bony defects such as those caused typically by cysts are part of the frequent disorders of the stomatognathic system. The majority of jaw cysts derive from the tissue of the tooth but and remain unnoticed clinically for a long time. They show a slow expansive growth, displacing anatomical neighbouring structures. Their removal is indicated before they cause or encourage damage (resorptions, secondary fractures, infections) (Heukron 1995). A cystectomy (Pattuch 10) removes the cyst sac completely and the resulting cavity is initially sealed. Where cavities are larger than the size of a cherry (> 2cm), there is a risk of wound infection, on account of the retention of the blood coagulum, which would lead to secondary treatment. In the 1950's Schulte therefore suggested stabilising the blood coagulum with a denatured gelatine sponge and oral anti-operative antibiotic prophylactic treatment (1955, 1956, 1965). For bigger cavities Schulte (1990) used the cellular blood constituents after centrifugation. The developments of recent years, e.g. Platelet-Rich-Plasma (PRP), have finally put the physiological qualities of the blood and, therefore, the biological factors in bone regeneration, in central place again (Marx et al., 1996). The aim of this study was to investigate clinical experiences with stabilised autologous venous blood coagulum after SCHULTE, over a 10-year period.

Material and Methods:

In a retrospective study the medical files of 175 inpatients were assessed, who, between 01.01.1990 – 31.12.1999, had bone defects fixed with stabilised venous blood coagulum after SCHULTE. In total, 157 osseous cavities, left after the removal of cysts, were fixed using this method.

Following the recommendations of Schulte (1990), venous blood of the patient, taken from an arm vein during the operation, was mixed in a metal bowl with denatured gelatine sponge (Gelaspon®, Chavin Arzneimittel GmbH, Rastatt/Bad., Germany) (Fig. 1). Penicillin G in a dose of at least 10000 IU/ml, this mostly being the total contents of the packet (1 million IU), is subsequently added to this mixture. Coagulation, hastened by the administration of antibiotics, is speeded up again with thrombin powder (Thrombin-JMB®, Gen Trec Incorporated, Middleton, Wisconsin, USA) (Fig. 2). Following Schulte's recommendation (1955) thrombin was added until the coagulation was visible. When the paste has been thoroughly mixed it is applied to the cavity without pressure using a suitable instrument (Fig. 3). While doing so attention should be paid to keeping the saliva contamination of the lumen as small as possible after the total removal of the cyst sac. Following primary suture, post-operatively, antibiotic prophylactic treatment with a penicillin preparation was carried out, mostly for a few days, to avoid resistance developing through the relatively small antibiotic concentration issuing from the coagulum.

Out of 175 inpatients with enlarged cysts, following cystectomy (n=157), there was a defective filling with the SCHULTE coagulum. The dimensions of each cyst were measured on the calibrated orthopantomograms. Postoperative infection rates and nerve function impairments were analysed retrospectively, and reossification was assessed by X-Ray.

Results:

Histologically 50% of the cases (99) were follicle cysts, 20% (40) were radical cysts, 10% (20) were residual cysts and twelve (8%) were other osseous lesions (Fig. 3 and 5 a to c). Only 10 of the 157 operation wounds (6.4%) resulted in a serious infection, necessitating additional surgical post-operative treatment. 11 patients with a mild post-operative infection did not require any additional measures. No patients had side effects caused by the operation (nerve function impairments, amongst others). Equally, no pathological features were observed. To do this, a correlation between the dimensions of the cyst and the occurrence of wound closure impairments could be found. Under X-Ray real reossification was found in 150 patients, recorded within the framework of routine follow-up tests including X-Ray tests (after 6 months at the earliest).

Fig. 5a to c show, as an example, the reossification of an enlarged cyst in the lower jaw after the filling of a crater with SCHULTE coagulum.

Conclusion:

Based on the results of the present study it can be summarised that the stabilised venous blood coagulum after SCHULTE can be recommended, now as before, as a low risk, easy to implement, and not least, as a reasonably priced method for the autologous regeneration of the bone in medium to large (> 2 cm) bone craters and renders alternative procedures, at least for alveolar process defects, superfluous.



Fig. 4: In toto removed cyst



Fig. 5a: Extended histologically proven odontogenic cyst of the mandible. After cystectomy the osseous lesion was filled by SCHULTE coagulum



Fig. 5b: Radiological finding after 6 months

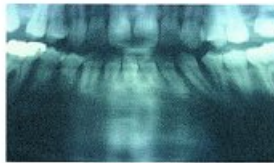


Fig. 5c: Radiological finding after 12 months

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