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Phenol-Peeling – Wie gefährlich ist die Kardiotoxizität?
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Qualitätsstandards in der ambulanten Dermatochirurgie
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FOCUS

Phenol Peeling – How dangerous is Cardiotoxicity

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BACKGROUND

Deep Chemical peels are currently experiencing a revival in Dermatology, although they are used since decades for facial rejuvenation. As in other fields of aesthetic dermatology such as laser therapies we have noticed an extremely high proportion of treatments that are not carried out by specialists, but by untrained and unqualified aestheticians. A feared complication of deep chemical phenol peeling is cardiotoxicity, which in rare cases can lead to death during treatment.

OBJECTIVE

To analyse the incidence of cardiac complications of deep chemical peels, a literature review was conducted. Based on this data and in the context of a recent death during a facial phenol peeling, suggestions to reduce the rate of this complications are made.

METHODS

A retrospective analyses of the clinic data in the literature is presented and discussed.

RESULTS

Even though cardiotoxicity due to the application of deep phenol peeling can have a fatal consequence in some rare cases, the data on the incidence of cardiac side effects with phenol peeling is very small. According to the available studies, an incidence of 5.0% - 6.6% is reported. In none of the published articles a deadly outcome was reported. It is assumed that phenol can lead to a prolongation of the QT interval, which in turn can lead to a dangerous ventricular repolarisation disorder, which in consequence can lead to ventricular fibrillation. Several medications are detected to prolong the QT interval. Moreover in 12% of the asymptomatic population show serious ventricular arrhythmias.

CONCLUSION

The incidence of 5-7% of cardiac complications during deep phenol peels is not to be neglected, particularly as the cardiotoxicity of phenol can lead to a fatal outcome. On the other hand, we can state that the reported cardiac arrhythmias were all mild and either self-limited or resolved with intravenously lidocaine application. Cardiac complications in association with deep phenol peels deserves further studies to determine safety parameters. In any case, it must be required that deep peelings are carried out exclusively by specialised professionals.

Introduction

Recently, a fatal incident occurred during a deep phenol facial peel. The treatment was performed by an aesthetician and influencer who had previously completed an online course on how to perform peels. Health Regulatory Agency has enacted a ban on the sale and use of phenol-based products in both general health and aesthetic procedures, i.e. also for specialised doctors. More and more specified treatments in aesthetic dermatology

are performed by non-trained non-professionals, which opens the discussion, if this trend is dangerous to our society or is negligible as in reality the incidence of severe side effects are very rare. Potential complications of deep phenol peelings are pigment alterations with both hyperpigmentation and hypopigmentation and scarring after prolonged wound healing either caused by incorrect application by the practitioner, deep infections or inappropriate behaviour by the patient [1].

Feared, however, are systemic complications with immediate reaction such as cardiac complications. Only very few scientific studies have been performed to validate the incidence of cardiac arrhythmias in full face deep chemical peel.

Methods

In this paper, we studied publications appeared in PubMed with the keywords «deep phenol peels, peeling and cardiotoxicity», which revealed 3 publications in «Pub med» and 12 publications in «Pub Med Central». Of the 3 publications found in «Pub med», 2 were of a general nature, systematically listing the general side effects without going into detail about the individual complications [1,2]. The authors concluded that further studies are needed, particularly with regard to systemic cardiotoxicity. Of the 12 other publications cited by «Pub Med Central», 2 papers mentioned the side effects of deep phenol peeling, although both papers did not go into depth concerning cardiotoxicity [3,4]. However, we found 3 interesting publications on cardiac complications including 2 reports printed in the «Research Letter», which underlines how much the topic is neglected so far [5-7].

Results

Wambier et al. presented a case of intraoperative torsade de pointes (TdP) regardless of normal rate-corrected QT interval in the perioperative 12-lead electrocardiogram (ECG). They published another 10 patients with ECG alteration under phenol treatment, i.e. transient intraoperative QT prolongation, all of them without clinical significant arrhythmia [5]. The QT interval is a measure of the duration of ventricular repolarization (*Figure 1*). TdP is known to be associated with prolonged QT interval and may resolve spontaneously

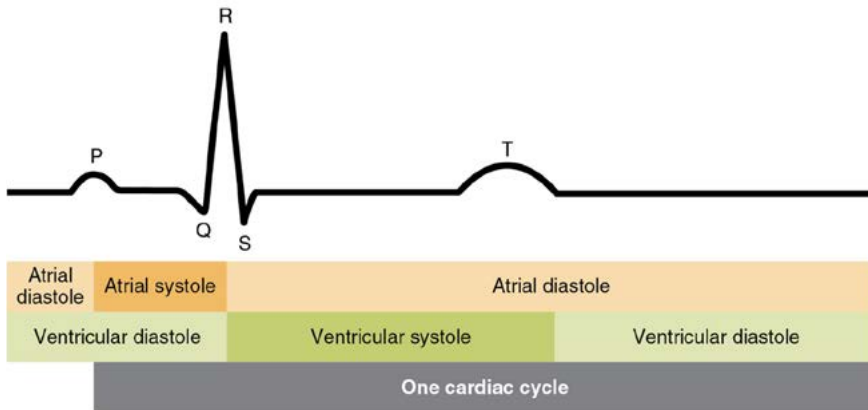


Figure 1: Initially, both the atria and ventricles are relaxed (diastole). The P wave represents depolarization of the atria and is followed by atrial contraction (systole). Atrial systole extends until the QRS complex, at which point, the atria relax. The QRS complex represents depolarization of the ventricles and is followed by ventricular contraction. The T wave represents the repolarization of the ventricles and marks the beginning of ventricular relaxation.

or can cause sudden death by degeneration into ventricular fibrillation [8] (Figure 2). A large group of drugs are known to prolong the QT interval and therefore a repolarisation delay of the ventricle, including antiemetics (prescribed for opioid-induced nausea), analgesics, antibiotics, antifungal, diuretics, antipsychotics and antidepressants [5].

A retrospective single center study by Rullan et al. included 200 patients who underwent full-face phenol-croton-oil peels between 2001 and 2023 [6]. They reported 10 patients (5%) with benign transient Arrhythmia without any therapy needed.

In another study with 181 consecutive, nonselected patients treated by full-face deep chemical peel between 2004 and 2005 revealed 12 patients (6.6%) cardiac arrhythmia during the procedure. In 4 patients the arrhythmia was

self-limited and did not require any intervention. In the other 8 patients, 100 mg of lidocaine was given intravenously to control arrhythmia. No hemodynamic instability was dedected in any of these cases [7].

Discussion

Phenol is directly toxic to the myocardium as studies in rats could show by decrease of myocardial contraction and electrical activity [9]. After resorption of Phenol 75% is excreted through kidney or metabolised by liver and 25% is degraded to CO₂ and water removed by respiration. The therapeutic range of topically applied Phenol and potential toxicity is very wide. The lethal dose of Phenol is not known, but blood levels after application of 3 ml of 50% solution were 0.68 mg/dl, whereas patient tolerated phenol levels of 23 mg/dl by accidentally oral uptake of

phenol [7]. The medium amount of Phenol used for a full-facial treatment is far under 1ml. Further, according to the guidelines for treating burn patients, the head corresponds to 9% of the total surface area of the body. Therefore it is unlikely to harm a patient with Phenol as the absorption rate is minimal. In addition, it could be shown, that in asymptomatic population the incidence of serious arrhythmias is 12% [10]. However, even interesting, one should consider that this data is dating back almost 50 years and morbidity of the normal population may have changed within time. The possible reasons for arrhythmias include QT prolongation from the phenol as a direct toxicity and an acute acidose from phenol absorption. However, concomitant treatments may also be responsible, such as adrenergic increase due to anxiety and more like to the burning sensation due to the treatment. A simultaneous increase in blood pressure during an arrhythmia could support this tease, as in case of phenol-induced cardiotoxicity we would expect a significant decrease of blood pressure. Numerous drugs are known to prolong the QT time. Simultaneous intake by the patient or application by the therapist of one of these subclasses can possibly trigger a cumulative toxic reaction. However, no data are available for this. Assuming that the arrhythmias are caused by the phenol and considering the minimal resorption rate due to the small treatment area, an increase in absorption rate should be postulated.

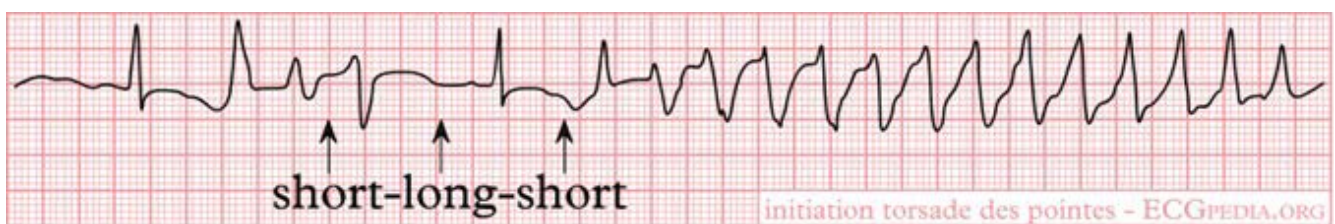


Figure 2: Torsade de Pointes (TdP) is a form of polymorphic ventricular tachycardia associated with a long QT interval and is typically initiated by a short-long-short interval. A ventricle extrasystole (first beat: short) is followed by a compensatory pause. The following beat (second beat: long) has a longer QT interval. If the next beat follows shortly thereafter, there is a good chance that this third beat falls within the QT interval, resulting in the R on T phenomenon and subsequent Torsades de Pointes.

Following factors influence the absorption of phenol during treatment:

- Surface of the treated area
- Texture of the treated area (oily or dry)
- Concentration of the applied phenol including amount of Croton-Oil
- Amount of product applied in time

As phenol is lipophilic, we are interested in degreasing the facial skin very well before the treatment in order to achieve good results. On the other hand, this also increases the risk of an increased absorption rate. However, as the face takes up less than 9% of the body surface (the whole head corresponds to 9%), the risk of increased absorption due to the degreasing pre-treatment is minimised. Many authors recommend to use instead of the Baker Gordon Solution (88% of Phenol) the modified Hetter solution. Although this recommendation is aimed more at reducing local side effects or complications, it is nevertheless conceivable that the use of lower concentrations of phenol can lead to a reduction in cardiac complications. However, this measure will be at the expense of the effect or the result to be expected later. It is generally recommended to divide the therapy into aesthetic segmental applications and to take a break of 10 minutes between applications. Own experience, however, showed that the incidence of arrhythmias was not increased when the treatment was performed continuously without any breaks. Additionally, pain- and in most cases sedoanalgesie-time should be held as short as possible due to both medical and psychological reasons.

Conclusion

Cardiac complications are severe possible side effects during deep peeling and should not be neglected. With an incidence of 5–7 % however they are quite rare and according to the literature in every case there were mild and mostly self-limited. In any case deep phenol peeling should always be per-

formed under cardiopulmonary monitoring and each therapist should be trained and skilled in the management of a cardiac problem. Therefore, this treatment is reserved only for specialized doctors, preferably in specialisation of dermatology and/or plastic surgery. Deep Phenol Peeling is a safe procedure under the condition that it is performed by a trained and skilled physician.

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