

Accidental Extrusion of Sodium Hypochlorite

Adverse Incident

The HSCB is aware of a recent adverse incident when sodium hypochlorite was accidentally extruded through the apex during root canal therapy (RCT). This occurred when placing the GP point which appears to have pushed a small quantity of sodium hypochlorite through the apex resulting in significant side effects.

The HSCB would like to raise awareness with the wider profession of the complications of accidental sodium hypochlorite damage, preventive measures to minimise potential complications and emergency management of accidental damage

Background

Sodium hypochlorite is very widely used, is an effective and inexpensive solution for use in RCT and is generally regarded as being safe. Complications are relatively rare though potentially serious.

There is no standard therapy for the management of complications associated with hypochlorite. However, the article in the link below provides advice on the complications from accidental spillage or extrusion to the soft tissues, preventive measures to minimise potential complications and emergency management of accidental hypochlorite damage.

<http://www.nature.com/bdj/journal/v202/n9/full/bdj.2007.374.html>

Summary

When sodium hypochlorite is extruded into the soft tissues, a severe acute inflammatory reaction of the tissues develops.

Prevention is the best policy and preventive measures include:

- Plastic bib to protect patient's clothing
- Provision of protective eye-wear for both patient and operator
- Consider the strength of sodium hypochlorite that you use
- The use of a sealed rubber dam for isolation of the tooth under treatment
- The use of side exit Luer-Lok needles for root canal irrigation
- Irrigation needle a minimum of 2 mm short of the working length
- Avoidance of wedging the needle into the root canal
- Avoidance of excessive pressure during irrigation

The following regime could be considered after the accidental extrusion of sodium hypochlorite into the periapical tissues:

1. Negative aspiration of the affected area using the same syringe
2. Irrigation of the area with abundant sterile saline solution. By doing this, the exposure time of the nervous tissue to the irrigant agent is reduced

3. Treat the intense and sudden onset pain suffered by the patient by performing re-anaesthesia of the affected area
4. Prescribe analgesics to reduce the oedema of the adjacent tissues - steroidal and non-steroidal anti-inflammatory drugs
5. Use cold packs during the first day in order to prevent swelling
6. Use hot compresses and warm rinses, starting after the second day, in order to stimulate local systemic circulation
7. Request advice or management from local maxillo-facial unit
8. Root canal treatment can be completed with the irrigant changed to a sterile saline solution or chlorhexidine gluconate (0.2%-2%)

The routine use of **antibiotics** is controversial and they should be administered only if there is clinical evidence of wound infection or if necrosis is expected.

Further information on the therapeutic concentration of sodium hypochlorite are detailed in appendices 1,2 and 3.

Appendix 1

Therapeutic Concentration of Sodium Hypochlorite

The most suitable concentration of sodium hypochlorite for endodontic irrigation may be 0.5 or 1% with the pH close to neutral, obtaining an optimal antimicrobial effect with minimal tissue irritating injury. However stronger concentrations of sodium hypochlorite (e.g., 2.5 %) are currently used by some dentists to eliminate anaerobic bacteria. Some literature has suggested using a warmed weaker solution to reduce the possible complications

Concentrations of Different Products

3% - Parcan, Classic Sodium Hypochlorite, HS Sodium Hypochlorite

2% or 5.25% - Chlorax

<6% - Chlor-Xtra

(thin bleach – 5%, Miltons – 2%; these were previously used but not licensed for endodontic use)

Appendix 2

Guide to diluting stock solutions

Dentists should have, as minimum, an entry on the patient record regarding the use of compounded (diluted) products. Subject to COSHH assessment it may be appropriate to use and retain a compounding worksheet and this is detailed below.

Use of a compounding worksheet is an effective quality control procedure. Details of the ingredients (including source, batch number and expiry date), formula, quantities, calculations, procedure, operator, safe handling and / or storage requirements, expiry date of final product, date of dispensing and usage directions (including a duplicate label) should be documented on the worksheet. All worksheets must be signed and dated by the dentist who prepared or supervised the preparation of the product before it is released for dispensing. The worksheets should be retained on the premises in a safe place and filed in chronological order for future reference should an adverse event or raw material recall occur. It is good practice to assign a reference number to the product which appears in the record and on the label on the product itself.

Ingredients must be sourced from recognised pharmaceutical manufacturers and be of a quality accepted for use in the preparation and manufacture of pharmaceutical products.

All compounded products should show the date prepared, expiry date on the label or on an expiry date sticker. Most compounded products only last up to 14 days before they become unstable. Many products may have even shorter expiry dates.

When diluting stock solutions e.g. sodium hypochlorite, it is important that calculations are documented in a standard format and checked. See worksheet for example

Appendix 3

Work sheet for production of Sodium Hypochlorite 0.5% solution

Ingredients

Stock solution	sodium hypochlorite 3% (e.g. Parcan)
Diluent	distilled water

Calculation

Strength of hypochlorite required: 0.5% w/v (S_1)
Volume of hypochlorite required: 150ml (V_1)
Strength of stock hypochlorite: 3% w/v (S_2)
Volume of stock hypochlorite: ? (V_2)

$$\begin{aligned} S_1 \times V_1 &= S_2 \times V_2 \\ 0.5 \times 150 &= 3 \times V_2 \\ V_2 &= 0.5 \times 150 / 3 \\ &= 25\text{ml} \end{aligned}$$

This 25ml is diluted with 125ml of distilled water to produce the 150ml of 0.5% hypochlorite required.

When dilution is completed the solution can be drawn up into a syringe with a side venting needle for immediate use or a bottle for storage.

The syringe / bottle must be correctly labeled with,

- name of solution
- strength
- preparation date
- expiry date
- storage conditions e.g. protect from light

Worked example of preparation worksheet

ITEM ORDERED:				
Sodium hypochlorite solution 0.5%				
FORMULA USED:				
S1 strength required		V1 volume required		
S2 strength of stock solution		V2 volume of stock solution		
$S1 \times V1 / S2 \times V2$				
CALCULATIONS:				
S1 = 0.5% sodium hypochlorite		V1 = 100ml		
S2 = 3%		V2 = ?		
$0.5 \times 150 / 3 = V2 = 25ml$				
NOTES:				
PRODUCTS USED:				
Sodium hypochlorite 3% solution		Diluent – distilled water		
INGREDIENT	MANUFACTURER	BATCH NUMBER	EXPIRY DATE	QUANTITY USED
Sodium hypochlorite	X	From stock bottle	From stock bottle	Xml
Distilled water	X			Xml
NAME AND SIGNATURE OF PERSON PREPARING PRODUCT			NAME	
			SIGNATURE	
NAME AND SIGNATURE OF SUPERVISING DENTIST			NAME	
			SIGNATURE	
DUPLICATE DISPENSING LABEL PLUS ANY ADDITIONAL LABELS:			PRODUCT REFERENCE NUMBER:	

Template for worksheet (can be copied)

ITEM ORDERED:				
FORMULA USED:				
CALCULATIONS:				
NOTES:				
PRODUCTS USED:				
<i>INGREDIENT</i>	<i>MANUFACTURER</i>	<i>BATCH NUMBER</i>	<i>EXPIRY DATE</i>	<i>QUANTITY USED</i>
<i>NAME AND SIGNATURE OF PERSON PREPARING PRODUCT</i>		<i>NAME</i>		
		<i>SIGNATURE</i>		
		<i>NAME</i>		
<i>NAME AND SIGNATURE OF SUPERVISING DENTIST</i>		<i>SIGNATURE</i>		
		<i>NAME</i>		
		<i>SIGNATURE</i>		
DUPLICATE DISPENSING LABEL PLUS ANY ADDITIONAL LABELS:		PRODUCT REFERENCE NUMBER:		