

SOP on Preparation of Human Skull Using Chickpea Expansion Method

**Department of Anatomy
Faculty of Medicine
UWUSL**

Standard Operating Procedure (SOP) on Preparation of Human Skull Using Chickpea Expansion Method

(1) Title

Preparation of Standard Operating Procedures (SOPs).

(2) Issued By

Department of Anatomy, Faculty of Medicine, Uva Wellassa University of Sri Lanka

(3) Purpose and Scope

This SOP provides a standardized, reproducible, and safe method for preparing human skull specimens using the chickpea expansion technique for anatomical teaching, museum preservation, and research. This procedure applies to, technical officers and laboratory assistants.

(4) Principle

The chickpea expansion method utilizes the hygroscopic and volumetric expansion properties of dried legumes. When chickpeas absorb water, their volume increases significantly (up to 2–3 times), generating gradual outward pressure.

(4.1) Mechanism of Action

- (4.1.1) Hydrated chickpeas expand within confined cranial spaces.
- (4.1.2) Controlled pressure is transmitted along sutural lines.
- (4.1.3) Progressive separation occurs at natural anatomical planes.

(4.2) Advantages

- (4.2.1) Minimizes mechanical trauma.
- (4.2.2) Preserves sutural morphology.
- (4.2.3) Avoids use of invasive tools.

(4.3) Limitations

- (4.3.1) Not suitable for fragile or immature skulls.
- (4.3.2) Requires prolonged monitoring.
- (4.3.3) Results may vary depending on bone density.

(5) Specimen Selection Criteria

(5.1) Inclusion Criteria

- (5.1.1) Fully ossified adult skulls.
- (5.1.2) Intact cranial vault.
- (5.1.3) Clearly identifiable sutures.

(5.2) Exclusion Criteria

- (5.2.1) Fragmented skulls.
- (5.2.2) Pathological bone conditions.
- (5.2.3) Immature skulls (open fontanelles)
- (5.2.4) Archaeological or brittle specimens.

(6) Materials and Equipment

(9.1) Consumables

- (6.1.1) Dried chickpeas (uniform size)
- (6.1.2) Distilled water
- (6.1.3) Cotton wool
- (6.1.4) Plasters

(9.2) Equipment

- (6.2.1) Plastic containers with lids
- (6.2.2) Forceps and probes

(9.3) Personal Protective Equipment (PPE)

- (6.3.1) Laboratory coat
- (6.3.2) Disposable gloves
- (6.3.3) Surgical mask
- (6.3.4) Protective goggles

(7) Procedure

- (7.1) Remove residual soft tissues using forceps. Remove brain matter through the foramen magnum using the forceps. (Or can take a skull that has been buried for 6 months.)
- (7.2) Boil the skull in water & dry the specimen completely.
- (7.3) Close the foramens using cotton wool and elasto plasters.



- (7.4) Use green gram to fill the frontal side of the skull.
- (7.5) Pack the cranial cavity with chickpeas and distribute them evenly.



(7.6) Place the specimen in a container and cover with water.



(7.7) Keep it 12 hours.

(7.8) Carefully separate the bones and air-dry in a well-ventilated area.



(7.9) Apply tissue varnish on the separated bones.



(8) Quality Control Measures

- (8.1) Visual inspection of sutures.
- (8.2) Structural integrity assessment.
- (8.3) Absence of residual organic matter.

(9) Acceptance Criteria

A skull specimen is considered acceptable if:

- (9.1) Sutures are clearly visible and intact.
- (9.2) No fractures or deformities.
- (9.3) Clean and dry surface.
- (9.4) Anatomical landmarks are preserved.

(10)Waste Disposal

- (10.1)Dispose used chickpeas as biological waste.
(10.2)Follow institutional waste disposal protocols.
(10.3)Disinfect reusable materials.

(11)Troubleshooting Guide

Problem	Cause	Corrective Action
No separation of bones.	Insufficient expansion	Soak in water for more time.
Cracking of the bones.	Excess pressure.	Use less quantity of chickpeas.
Uneven results.	Poor distribution.	Refill properly.
Odor.	Contamination.	Clean the specimen.

(12) Edited by

Dr. Lakmal Hewage

MBBS (COL), MD SURGERY (COL), MRCS (ENG)
Consultant Neurosurgeon, Senior Lecturer (Grade II)
Head of the Department of Anatomy

Snr. Prof. Muditha Vidanapathirana

MBBS (Col), DLM, MD, MA (SJP), FFFLM (UK)
Dean, Faculty of Medicine, Uva Wellassa University of Sri Lanka

Mrs. Nishadi Sachinthani Rodrigo

BSc. Anatomy (Special) (USJ), MSc (UOC), PG. Cert. (Andrology) (UOC)
Lecturer (Probationary)

Dr. Nishantha Liyadipita

MBBS (Col), PG Dip. Anatomy
Senior Medical Officer
Base Hospital Welimada

Mr R. Kulendran

Chief Technical Officer
Department of Anatomy, Uva Wellassa University of Sri Lanka.

Dr. H.M. Piyumika Prabodhani

MBBS (Ruhuna)

Temporary Demonstrator, Department of Anatomy

Dr. M.M. Chathurika Piyumali

MBBS (Peradeniya)

Temporary Demonstrator, Department of Anatomy