NEUROSURGERY

IHH Healthcare

Minimally Invasive Parafascicular Surgery using the **BrainPath Approach**

KEY PROCEDURE HIGHLIGHTS

1. Remove deep-seated and/or previously inoperable blood clots or brain tumours with **minimal to no trauma to the patient**.

2. Less invasive than traditional craniotomies, allowing **preservation of brain tissues**.

3. Reduce mortality with **early improved clinical outcomes and functional status**.[1,2]

WHAT IS MIPS AND THE BRAINPATH APPROACH

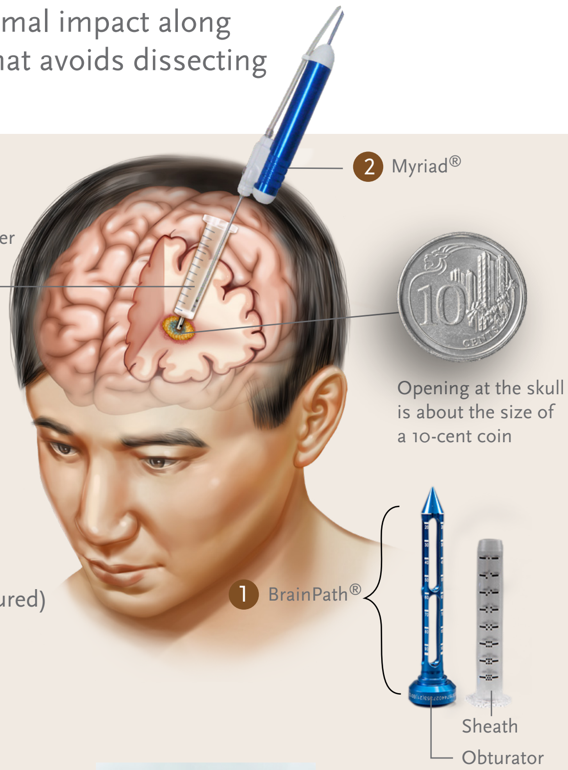
A minimally invasive parafascicular surgery (MIPS) is a deficit-sparing neurosurgical approach to reach brain lesions that do not present to the surface - **tumours and intracerebral haemorrhage (ICH)**. MIPS parts the brain tissues with minimal impact along a parafascicular route along the natural folds of the brain that avoids dissecting white matter connections.

BrainPath® is the world's first and only navigable parafascicular approach using image-guided trans-sulcal access between the brain fibres rather than through them, and can be used for a wider patient population.[1]

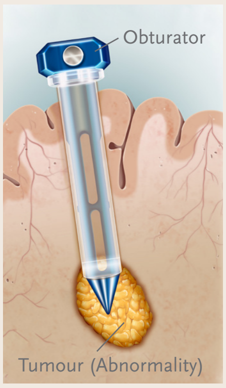
Before this, there was no effective surgical option for many tumours and brain-bleed conditions due to bleak recovery or survival odds.[2]

Three accessories make up the BrainPath® Approach:

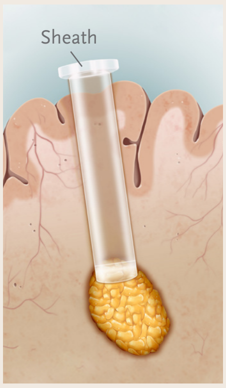
1. BrainPath: Access without cutting through white matter
2. Myriad®: Automated tissue removal without using heat
3. Tissue Preservation System: Tissue collection and preservation (not pictured)



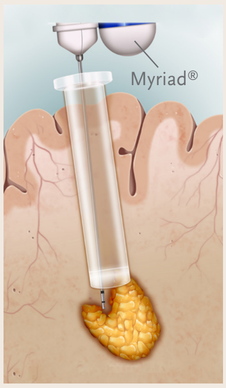
HOW IT WORKS



Using a GPS navigation system, the obturator slides through the delicate folds and fibres of the brain to the location of abnormality.



The obturator is removed leaving the plastic sheath behind to act as a protective opening for the surgeon to access the surgical site.



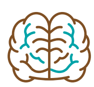
Myriad®, a side aspirating and cutting tool is inserted through the sheath to remove the abnormality.

INDICATIONS FOR USE

BrainPath® first received FDA clearance in 2012 and updated clearance in July 2015 for use in specific diseases states such as:

Primary and Secondary Brain Tumours[∞]

Intraventricular Tumours and Cysts



Vascular Abnormalities and Malformations

- **Primary Bleeds**
  better known as haemorrhagic stroke including ICH - the deadliest form of stroke
- **Secondary Bleeds**
  such as traumatic brain injuries and arteriovenous malformation

[∞]Such as high-grade gliomas and glioblastoma multiforme with a 15-month survival rate

 The above illustrations depict brain tumours. BrainPath® and Myriad® is the tool and not a treatment.

BENEFITS OF MIPS-BRAINPATH

Patients who undergo MIPS-BrainPath is more likely to transfer from post-anaesthesia to the hospital floor since the surgery is less invasive, controls blood loss, minimizes operative times and is fostered under awake conditions.[3-10]

TRADITIONAL*

No routine path used to access brain abnormalities and use of advanced image-guided technology is not mandatory

Trans-gyral: Shortest route to tumour but more likely to cut through normal brain matter

Harder to reach deep-seated tumours in the brain

Path to tumour is not parallel to white-matter tracts and may transect.

Larger opening of skull bone

Slower wound healing due to larger skin incision

More pain and slower recovery

MIPS-BRAINPATH

Advanced image-guided technology and computerised planning are always used to plan the most optimal path to the tumour

Trans-sulcal: Longer route but goes through the natural folds of the brain

Able to access deep-seated tumours in the brain

Path to tumour is parallel to the white-matter tracts of the brain. A longer trajectory may be selected to achieve this.

Smaller opening of the skull bone

Faster wound healing due to smaller skin incision

Less pain and faster recovery

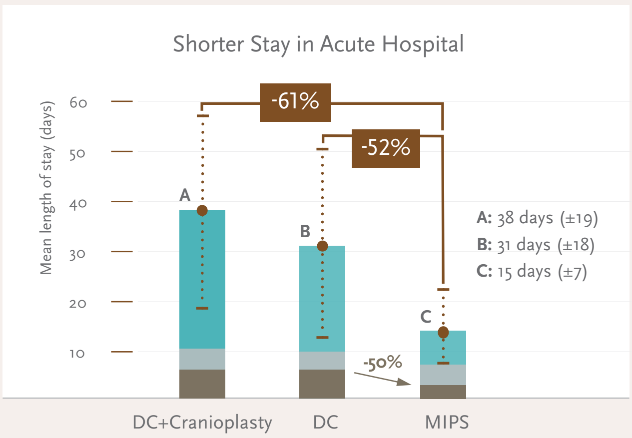
IMPACT OF MIPS ON ICH STROKE MANAGEMENT IN SINGAPORE+[13]

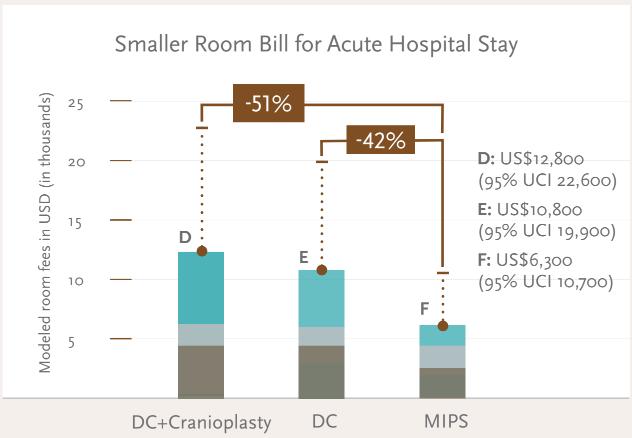
REDUCED LENGTH OF STAY (LOS)

The mean LOS at the NICU **decreased by 50%** from 6 days (±2) for DC^ to 3 days (±1) for MIPS.

REDUCED COST

With a shorter operating time and LOS (total and NICU), MIPS leads to cost savings.





Neurointensive Care (NICU) | High dependency or intermediate care units | General Ward

^ Decompressive Craniectomy

* 4 general categories of brain surgery: Craniotomy, Biopsy, Minimally Invasive Endonasal Endoscopic Surgery, Minimally Invasive Neuroendoscopy. Use is dependent on the problem being treated.

\+ Excludes medication, imaging, additional therapies and other miscellaneous costs. Dots represent the overall means and the whiskers, standard deviations ('Shorter Stay in Acute Hospital') or 95% upper confidence limit ('Smaller Room Bill for Acute Hospital Stay').

View the economic analysis on how BrainPath achieves the **Triple Aim.**[11]

PATIENT SELECTION[12]

The application of BrainPath® is based **not by tumour abnormality type, but rather its location.** It is appropriate for candidates with lesions, neoplasms or hematomas:

- Located deep within the lobar white matter and subcortical surface
- That are intracerebral and periventricular
- Involving the basal ganglia
- Located in the cerebellar hemispheres

THE LEADING HOSPITAL IN ASIA OFFERING MIPS-BRAINPATH

BrainPath® is available at Parkway Hospitals Singapore, practised by our neurosurgeon. He is the 1st in Asia Pacific to be trained in using this integrated surgical approach and a member of the Subcortical Surgery Group (SSG) leadership committee.

Learn how SSG supports the awareness and advancement of BrainPath® in Asia and Europe

Parkway Hospitals Singapore is equipped with advanced robotic visualization and navigation systems (image-guided high- magnification), such as the **Zeiss Kinevo** that is essential for our neurosurgeons to make the right clinical decisions for complex cases.

The availability of such technology for Exoscopic visualization is preferred for the BrainPath approach to support enhanced visualization of the surgical site, 'heads up' display, and bimanual surgical technique.

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