

Bali Medical Journal



INDONESIAN PHYSICIAN FORUM &
INDONESIA COLLEGE OF SURGEONS,
INDONESIA

Editor-in-Chief

Prof. Dr. Sri Maliawan, SpBS

([Scopus ID](#)), ([Google scholar](#))

srmaliawan@unud.ac.id / maliawans@yahoo.com
Department of Neuro Surgery, Udayana University
Sanglah General Hospital
Bali - Indonesia

Associate Editor

Prof. Putra Manuaba, M.Phil

([Scopus ID](#)), ([Google Scholar](#))

putramanuaba@unud.ac.id / putramanuaba28@yahoo.com
Biomedicine Postgraduate Program, Udayana University
Bali - Indonesia

Prof. Ketut Suwiyoga, SpOG

([Scopus ID](#))

suwiyoga@unud.ac.id
Faculty of Medicine, Udayana University, Sanglah Hospital Denpasar, Bali-Indonesia

Editorial Board for Regional America

Ankit Sakhuja, M.B.B.S., F.A.C.P., F.A.S.N.

([Scopus ID](#))

asakhuja@med.umich.edu
Nephrology and Hypertension Cleveland Clinic (United States)

Editorial Board for Regional Australia

Professor John Svigos, AM

MBBS; DRCOG; CBioEth; FRCOG; FRANZCOG

([Scopus ID](#))

john@svigos.com.au

Discipline of Obstetrics & Gynaecology
Faculty of Health & Medical Sciences
University of Adelaide, South Australia

dr Deasy Ayuningtyas Tandio MPH-MBA.

([OrcidID](#))

deasytandio@yahoo.com
James Cook University Australia Master of Public Health Master Of Business Administration, Indonesia

Editorial Board for Regional Europa

Prof. Harald Hoekstra

([Scopus ID](#))

jsvigos@iprimus.com.au

Editorial Board for Regional Asia

Prof Huang Qin

([Scopus ID](#))

qhuang@cqu.edu.cn

Chairman Dept. of Neurosurgery, Guangdong 999 Hospital Guangzhou China

Assoc. Prof. Mohammad Amin Bahrami

([Scopus ID](#))

aminbahrami1359@gmail.com

Head of healthcare management department, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

Dr. Tanveer Beg, PhD

([Scopus ID](#))

tbmirza@jazanu.edu.sa

Assistant Professor, Department of Biology, Faculty of Science, Jazan University, Jazan, Saudi Arabia.

Editorial Board Members

Prof. Andi Asadul Islam

([Scopus ID](#)), ([Google Scholar](#))

undee@med.unhas.ac.id

Faculty of Medicine Hasanudin University, Makasar-Indonesia

Prof. Dr. dr. Abdul Hafid Bajamal, Sp.BS

([Scopus ID](#))

hfbajamal@gmail.com

Faculty of Medicine Airlangga University, Surabaya-Indonesia

Dr. dr. I Wayan Sudarsa, Sp.B(K) Onk, FINACS, FICS.

([Scopus ID](#)), ([Google Scholar](#)), ([Researchgate](#))

dr. I.B. Amertha P. Manuaba, SKed, MBiomed.

([Scopus ID](#)), ([Google Scholar](#)), ([ORCID](#)), ([Researcher ID](#)) ([Researchgate](#))

AmerthaManuaba@gmail.com / Amertha_Manuaba@unud.ac.id

Faculty of Medicine, Universitas Udayana, Indonesia

Editorial inquiries to be addressed to:

email 1: editorbalimedicaljournal@gmail.com

email 2: editor@balimedicaljournal.org

Vol. 12 No. 1 (2023): (In Press : 1 April 2023)

Post-chemotherapy response of paclitaxel and carboplatin regimens in advanced stage cervical cancer types of histopathology squamous cell carcinoma and adenocarcinoma

Yohanes Adhitya Prakasa Sukoco, Meitria Syahadatina Noor, Ferry Armanza, Hariadi Yuseran, Renny Aditya
Online First: Feb 23, 2023

Effects of Lactobacillus plantarum IS-10506 on gastric protective mucosal factors: an ibuprofen-induced gastric mucosal injury

Andy Darma, Wibi Riawan, Khadijah Rizky Sumitro, Alpha Fardah Athiyah, Reza Ranuh, Mohammad Fathul Qorib, Ingrid Surono, Subijanto Marto Sudarmo

Prevalence of multidrug-resistant Escherichia coli isolated from Jember hospital food handler in Indonesia

Enny Suswati, Supangat, Laksmi Indreswari, Farhatina Nur U'alifa, Faiza Nabila, Inas Gama Putri Hertian
Online First: Feb 28, 2023

Sarcopenia as an indicator of nutritional status and outcome predictor for colorectal cancer in Javanese ethnic

Damianus Hipolitus, Adeodatus Yuda Handaya, Agus Barmawi
Online First: Dec 5, 2022

Comparison of chlorhexidine 0.7% and modified Petroff's method on sputum decontamination for culture method to detect Mycobacterium tuberculosis

Rizky Hurriah Lumbessy, Ni Made Mertaniasih, Lindawati Alimsardjono, Soedarsono Soedarsono
Online First: Jan 7, 2023

Comparison of agility between the flat foot and normal foot in East Java Puslatda athletes

Bobby Kennedy, Damayanti Tinduh, Ditaruni Asrina Utami, I Putu Alit Pawana, Soenarnatalina Melaniani
Online First: Jan 24, 2023

A novel preoperative scoring system to predict postoperative mortality after pancreaticoduodenectomy in pancreatic cancer patients at Dr. Soetomo General Hospital: a retrospective cohort study

Arland Chandra, Tomy Lesmana
Online First: Feb 20, 2023

Relationship between angiopoietin-like-protein-2 levels and anti-mullerian hormone levels in polycystic ovary syndrome of reproductive age

Dyan Asih Rachmawati, Ashon Sa'adi, Budi Utomo, Arif Tunjungseto
Online First: Feb 26, 2023

The impact of COVID-19 vaccination for healthcare workers on the SARS-CoV-2 antibody titers in a tertiary hospital in Jakarta, Indonesia

Rika Bur, Febby Elvanesa Sandra Dewi, Virmandiani, Yosanti Elsa Kartikawati, Meutia Gebrina, Aditya Rifqi Fauzi, Duddy Mulyawan, Ni Sayu Dewi Budhiyani
Online First: Dec 25, 2022

Factors that determine inpatient satisfaction on nursing care: a cross-sectional study

Sulaiman , Anggriani , Maryaningsih, Ronald Erwansyah, Lagut Sutandra Siregar, Muchti Yuda Pratama, Selly Oktaria, Rahmadi Ali, Yenni Gustiani Tarigan
Online First: Jan 24, 2023

Development of nursing learning program for COVID-19 patients with e-learning method for nursing department students Poltekkes Ministry of Health Jayapura Papua

Blestina Maryorita, Jems Kifen Roget Maay
Online First: Jan 24, 2023

Does transcutaneous Vagus Nerve Stimulation (tVNS) reduce pain intensity in chronic low back pain patients? A randomized controlled pilot study

Muhammad Jasman Erwin Halim, Lydia Arfianti, I Putu Alit Pawana, Soenarnatalina Melaniani

The effect of exercise using incentive spirometry on heart rate variability in patients after COVID-19 infection

Hilman Harisuddin, Imam Subadi, Nuniek Nugraheni Sulistiawati, Andriati, Soenarnatalina Melaniani

Online First: Feb 1, 2023

The relationship of biofilm Staphylococcus aureus with degree of severity and infection in patients of chronic rhinosinusitis

Teuku Husni T.R, Karina Witary Ayu Siagian, Benny Kurnia

Online First: Feb 28, 2023

Correlation between the number of Interstitial cells of Cajal (ICC) and defecation pattern in patients with Hirschsprung's disease after Duhamel's surgery at General Hospital Dr. Soetomo

Yohanes Santosa Honggowarsito, Adria Hariastawa, Fendy Matulatan, **Alphania Rahniayu**

Online First: Feb 9, 2023

The potential role of MMP-9 and VEGF-C as predictors of lymph node involvement in papillary thyroid carcinoma

Sonar Soni Panigoro, Muhammad, Diani Kartini, Bob Andinata, Boy Subirosa Sabarguna, Agnes Stephanie Harahap

Online First: Jan 5, 2023

Correlation between platelet distribution width and mean platelet volume with the stage of hepatocellular carcinoma based on Barcelona Clinical Liver Cancer criteria

Fauzi Yusuf, Desi Maghfirah, Azzaki Abubakar, Teuku Irfan, Meutia Rizki Innayah

Online First: Dec 26, 2022

High ratio of neutrophils to lymphocytes and high triglyceride levels in serum as risk factors for pre-eclampsia

Anak Agung Ngurah Jaya Kusuma, Endang Sri Widiyanti, Anak Agung Gde Marvy Khrisna Pranamartha, Adytia Theopani Bineredo Damanik

Online First: Mar 17, 2023

Factors affecting patient safety culture in the nursing section of a type C private hospital in Surakarta using structural equation modeling

Lobes Herdiman, Susy Susmartini, Dewani Asmara Sekartaji Pangau, I Gusti Ngurah Priambadi

Online First: Feb 13, 2023

Balinese purnajiwa (Kopsia arborea Blume.) extract stimulates male rats' sexual behavior and plasma testosterone level

I Gede Putu Wirawan, Maria Malida Vernandes Sasadara, I Made Jawi, Ida Ayu Putri Darmawati, I Nyoman Wijaya, Anak Agung Keswari Krisnandika, I Gde Nengah Adhilaksman Sunyamurthi, I Gusti Ngurah Alit Susanta Wirya

Online First: Mar 26, 2023

Plasma marker ACTH, cortisol, and beta-endorphins profile on pregnant women as targeted marker of approach for antenatal depression

I Putu Satrya Wijaya, Titin Andri Wihastuti, I Wayan Arsana Wijaya, Muhammad Chair Effendi

Online First: Feb 4, 2023

Jatropha multifida L stem sap gel versus Aloe vera gel to post-gingivectomy healing process

Khusnul Munika Listari, Tsarwah Az-Zahra, Amalia Hasanah, Yessy Agistasari

Online First: Jan 27, 2023

Overview of prolactin levels in patients with schizophrenia during antipsychotic therapy at HB. Saanin Mental Hospital Padang, Indonesia

Dita Hasni, Bayu Eka Surya, Mutiara Anissa, Debie Anggraini

Online First: Feb 24, 2023

Correlation between the number of Interstitial cells of Cajal (ICC) and defecation pattern in patients with Hirschsprung's disease after Duhamel's surgery at General Hospital Dr. Soetomo



Yohanes Santosa Honggowarsito^{1*}, I Gusti Bagus Adria Hariastawa²,
Fendy Matulatan², Alphaenia Rahniayu³

¹Resident of Pediatric Surgery,
Department of Surgery, Faculty of
Medicine, Universitas Airlangga/ Dr.
Soetomo General Hospital, Surabaya,
East Java, Indonesia;

²Pediatric Surgery Consultant,
Department of Surgery, Pediatric Surgery
Division, Faculty of Medicine, Universitas
Airlangga/ Dr. Soetomo General Hospital,
Surabaya, East Java, Indonesia;

³Anatomical Pathology Consultant,
Department of Anatomical Pathology,
Faculty of Medicine, Universitas
Airlangga/ Dr. Soetomo General Hospital,
Surabaya, East Java, Indonesia;

*Corresponding author:
Yohanes Santosa Honggowarsito;
Resident of Pediatric Surgery,
Department of Surgery, Faculty of
Medicine, Universitas Airlangga/ Dr.
Soetomo General Hospital, Surabaya,
East Java, Indonesia;
ysh.ps777@gmail.com

Received: 2022-11-31

Accepted: 2023-01-25

Published: 2023-02-09

INTRODUCTION

Hirschsprung's disease is a congenital disorder of the distal intestine caused by the absence of ganglions in the Aurbach and Meissner plexuses. This disorder has an incidence of up to 1:5,000 live births.¹ The prevalence among Asian people is around 1:3,847 live births.² There are no clear data about prevalence in Indonesia. The definitive treatment for this disorder is surgery, with resection of the aganglionic segment of the intestine and pull-through of the ganglionated segment. However, in some cases, bowel motility disorders still occur even though definitive surgery has been performed.³

It is undeniable that one of the postoperative complications of

Hirschsprung's disease is constipation, ranging from 30.8% of 161 patients who have undergone surgery.² From other studies, it was also found that 11% -35% of patients experienced constipation and soiling after a pull-through procedure. The exact cause for this condition is not yet known. This persistent defecation disorder illustrates that the intestinal segment that has sufficient ganglion alone does not give satisfactory results.⁴

Interstitial cells of Cajal are one of the factors for intestinal motility as smooth muscle pacemakers. If there is a decrease in the number of ICC, it can cause intestinal dysmotility, which causes constipation.⁵ Several studies have shown that there is a disturbance in ICC distribution in

patients with Hirschsprung's disease.^{6,7} In the resected intestinal segment, fewer Cajal interstitial cells were found than in the normal intestine and only formed sparse tissue. This is suspected as the cause of constipation in patients who have undergone definitive surgery. The presence of these factors can be assumed to be predictive of the occurrence of a disorder of defecation in patients who have had pull-through surgery.

The aim of this study was to find a correlation between impaired numbers of ICC from ganglionated bowel resection tissue in patients with Hirschsprung's disease who had undergone Duhamel pull-through surgery and impaired postoperative defecation patterns.

ABSTRACT

Background: Hirschsprung is a congenital disorder of the distal bowel caused by the absence of a ganglion in the Aurbach and Meissner plexuses. Definitive treatment of the disorder is operative, namely by resection of the aganglionic segment of the intestine and performing a pull-through on the ganglionic segment. It cannot be denied that there are still disturbances in the pattern of defecation after definitive surgery, even though the pull-through segment has enough ganglion cells. Interstitial cells of Cajal (ICC) are the pacemaker in smooth muscle contraction in the intestine. In several studies, the number of these cells decreased in Hirschsprung's disease (HD), and it is not known with certainty the effect on the occurrence of defecation pattern disturbances.

Methods: Data were collected retrospectively from all patients with Hirschsprung's Disease (HD) who underwent Duhamel Procedure in Dr. Soetomo General Hospital, starting January 2016 – December 2021. Correlation analytic research with a cross sectional design was performed to analyze the correlation between the number of ICC and the defecation pattern of patients at Dr. Soetomo after Duhamel surgery.

Results: From this study, it was found a decrease in the number of ICC in the ganglionic segments of the resected specimens from pull-through surgery. From the results of the correlation test, it was found that the p-value was 0.49 for the defecation pattern of postoperative Duhamel patients at Dr. Soetomo for the period January 2016 – December 2021.

Conclusion: In this study, a significant correlation was found between the number of ICC and definitive pull-through postoperative defecation pattern.

Keywords: *defecation, hirschsprung's disease, interstitial cell of Cajal, Duhamel technique surgery.*

Cite This Article: Honggowarsito, Y.S., Hariastawa, I.G.B.A., Matulatan, F., Rahniayu, A. 2023. Correlation between the number of Interstitial cells of Cajal (ICC) and defecation pattern in patients with Hirschsprung's disease after Duhamel's surgery at General Hospital Dr. Soetomo. *Bali Medical Journal* 12(1): 675-677. DOI: 10.15562/bmj.v12i1.4154

METHODS

This was an analytic observational study with cross sectional design. Data were collected retrospectively from medical records of all patients with Hirschsprung's Disease who underwent the Duhamel procedure in Dr. Soetomo General Hospital, starting from January 2016 – December 2021. We use total sampling to obtain the samples with inclusion criteria that the patients have the specimen which eligible for C-kit staining and the exclusion criteria if the specimens are not available for C-kit staining.

All data were entered into SPSS v26.0 for Windows. Shapiro – Wilk analysis was used for determining the distribution of the data, such as age and the number of ICC. The correlation between the ICC and Rintala scoring uses Spearman analysis.

RESULTS

In the Shapiro – Wilk normality test, it was found that the data were not normally distributed, then an analysis of the relationship test was carried out using the Spearman test. $P = 0.049$, where $P < 0.05$, so it can be concluded that there is a significant correlation between the Rintala score and the number of Cajal interstitial cells in the internal muscular layer. The value of $r = 0.369$ was obtained, which indicated the strength of the correlation was 36.9%, which included weak criteria. The characteristic of the sex shown in Table 1.

The result of Rintala scoring is shown in Table 2, and the calculation number of ICC in the inner muscular layer and outer muscular layer is shown in Table 3. The Spearman analysis between Rintala scoring and the number of ICC in the inner muscular layer is shown in Table 4, and between Rintala scoring and the number of ICC in the outer muscular layer is shown in Table 5. The difference between a normal distribution and scattered C-kit positive ICC in the ganglionic intestine is shown in Figure 1.

DISCUSSION

Definitive pull-through is the only treatment for Hirschsprung's disease, with the removal of a ganglion segment of the intestine. While most patients did well

after a one-stage pull-through operation, a small number of patients suffered from postoperative complications. Several studies have shown that the presence of residual bowel tissue containing abnormal ICCs, which have normal ganglion, can result in functional motility disorder and postoperative constipation in HD patients.⁸

In a study observing the long-term outcomes of patients with Hirschsprung's disease, out of 194 people, 20 people experienced soiling 42 people (21.7%) experienced constipation. A total of 48 people underwent definitive pull-through surgery using the Duhamel technique, and 8.3% were still constipated.⁹ From another study conducted in India, patients with Hirschsprung's disease who underwent surgery using the Duhamel technique, as many as 29.42% experienced soiling, 11.76%, strictures 11.76%, enterocolitis 11.76%, and 11.76% still experience postoperative constipation.¹⁰ A study found that some HD patients had reduced numbers of ICCs in their proximal

ganglionic bowel. Therefore, insufficient resection of such bowel could be a cause of motility disturbances and recurrent constipation.¹¹ Another study shows the

Table 1. Characteristics of the patients.

Sex	n	(%)
Male	20	68.97
Female	9	31.03
Age (year)		
Minimum		3
Maximum		23
Mean		9.24
Median		8.00
Mean \pm SD		9.24 \pm 4.86

Table 2. Rintala scoring.

Rintala	n	%
Poor	1	3.4
Fair	2	6.9
Good	12	41.4
Excellent	14	48.3

Table 3. Interstitial cells of Cajal.

	ICC	P value
Inner Muscular Layer		
Range	2 - 131	
Median	16.00	
Mean	21.03	
Mean \pm SD	21.03 \pm 24.2	
Outer Muscular Layer		
Range	1 - 89	
Median	12.00	
Mean	16.83	
Mean \pm SD	16.83 \pm 17.67	

*Normal distribution if $P > 0.05$

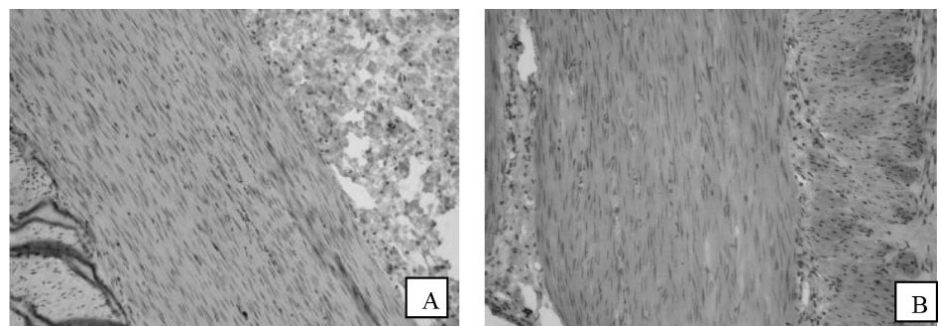


Figure 1. (A) Photomicrographic shows a normal distribution of C-kit positive ICCs in the ganglionic intestine (IHC x200). (B) Photomicrographic shows scattered distribution c-kit positive ICCs in the ganglionic intestine (IHC x200).

Table 4. Correlation of ICC on the inner muscular layer with Rintala scoring.

Rintala	N	Inner muscular layer				P-value	r
		Range	Median	Mean	Mean +SD		
Poor	1	22-22	22	22		0.049	0.369
Fair	2	2-40	21	21	21 + 26.87		
Good	12	2-40	10	14.58	14.58 + 11.996		
Excellent	14	4-131	16.50	26.50	26.50 + 31.843		

*Significant if P < 0.05

Table 5. Correlation of ICC on the outer muscular layer with Rintala scoring.

Rintala	N	Outer muscular layer				P-value	r
		Range	Median	Mean	Mean +SD		
Poor	1	11-11	11	11		0.064	0.348
Fair	2	7-24	15.50	15.50	15.50 + 12.02		
Good	12	2-42	9.50	11.42	11.42 + 11.23		
Excellent	14	1-89	12.50	22.07	22.07 + 22.24		

*Significant if P < 0.05

correlation between colonic motility disorders, manometric findings, and the expression of ICCs.¹² In this study, ICCs are defective not only in the ganglionic bowels of HD disease but also in specimens from chronic intestinal pseudo-obstruction and idiopathic intractable constipation patients.¹² Not only the reduction in ICCs in the ganglionic part of the HD bowel but the ICCs also present formed only a sparse network around the ganglia of the myenteric plexus compared to normal controls.⁸

We assessed the patient's defecation patterns using the Rintala score to determine the defecation problem of the patients and categorized them into 4 categories: excellent, good, fair, and poor.¹³ In our study, we analyze the ganglionic segment with C-kit positive for ICC. There's a significant correlation between the number of ICC in the inner muscular layer and disturbance of defecation pattern. The more it has ICC, and the patient has better defecation pattern according to the Rintala score. Another study also describes a few cases suffering from severe constipation or enterocolitis resulting in patient death after a definitive operation for Hirschsprung's disease, even though the normoganglionic intestine had been successfully pulled through. A decrease in ICCs distribution using c-kit immunostaining in the normoganglionic segment is probably the cause of this problem.¹⁴ The limitation of this study was

that our design study couldn't rule out the dietary problem of the defecation pattern.

CONCLUSION

We conclude from this study that a decrease of ICC in the normoganglionic bowel can affect the outcome of patients after definitive pull-through surgery.

ETHICAL CONSIDERATIONS

This study was approved by The Research Ethics Committee of Dr. Soetomo General Academic Hospital (Ref No. 0461/KEPK/VIII/2022).

CONFLICT OF INTEREST

No conflict of interest.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

AUTHOR CONTRIBUTION

YSH: Concept, methodology, preparation of the manuscript. AH: Supervision and guidance. FM: Supervision and guidance. AR: consultant of Anatomical Pathology.

REFERENCES

- Jacob CL. Hirschsprung Disease. Holcomb and Ashcraft's Pediatric Surgery, 7th Edition. Elsevier. 2020.

- Taghavi K, Goddard L, Evans SM, et al. Ethnic variations in the childhood prevalence of Hirschsprung disease in New Zealand. *ANZ J Surg.* 2019;89(10):1246-1249. doi:10.1111/ans.14857.
- Khazdouz M, Sezavar M, Imani B, Akhavan H, Babapour A, Khademi G. Clinical outcome and bowel function after surgical treatment in Hirschsprung's disease. *Afr J Paediatr Surg.* 2015;12(2):143-147. doi:10.4103/0189-6725.160403.
- Rolle U, Piotrowska AP, Nemeth L, Puri P. Altered distribution of interstitial cells of Cajal in Hirschsprung disease. *Arch Pathol Lab Med.* 2002;126(8):928-933. doi:10.5858/2002-126-0928-ADOICO.
- Mostafa RM, Moustafa YM, Hamdy H. Interstitial cells of Cajal, the Maestro in health and disease. *World J Gastroenterol.* 2010;16(26):3239-3248. doi:10.3748/wjg.v16.i26.3239.
- Chen X, Zhang H, Li N, Feng J. Pathological changes of interstitial cells of Cajal and ganglion cells in the segment of resected bowel in Hirschsprung's disease. *Pediatr Surg Int.* 2016 Nov;32(11). p1019-1024. doi:10.1007/s00383-016-3961-7.
- Henna N. Expression of Interstitial Cells of Cajal in Colorectum of Patients with Hirschsprung's Disease. *Biomedica.* 2017;33(2). p124-127.
- Gfroerer S, Rolle U. Interstitial cells of Cajal in the normal human gut and in Hirschsprung disease. *Pediatr Surg Int.* 2013;29(9):889-897. doi:10.1007/s00383-013-3364-y.
- Menezes M, Corbally M, Puri P. Long-term results of bowel function after treatment for Hirschsprung's disease: a 29-year review. *Pediatr Surg Int.* 2006;22(12):987-990. doi:10.1007/s00383-006-1783-8.
- Aravind KL, Nisha N, Sushmitha R, and Madiwal C. Duhamel's procedure for Hirschsprung's disease and the functional outcome in a tertiary care center. *Indian Journal of Child Health.* 2021;8(1). p51-55. <https://doi.org/10.32677/IJCH.2021.v08.i01.010>.
- Rolle U, Piaseczna-Piotrowska A, Puri P. Interstitial cells of Cajal in the normal gut and in intestinal motility disorders of childhood. *Pediatr Surg Int.* 2007;23(12):1139-1152. doi:10.1007/s00383-007-2022-7.
- van den Berg MM, Di Lorenzo C, Mousa HM, Benning MA, Boeckstaens GE, Luquette M. Morphological changes of the enteric nervous system, interstitial cells of cajal, and smooth muscle in children with colonic motility disorders. *J Pediatr Gastroenterol Nutr.* 2009;48(1):22-29. doi:10.1097/MPG.0b013e318173293b.
- Rintala RJ, Lindahl H. Is normal bowel function possible after repair of intermediate and high anorectal malformations?. *J Pediatr Surg.* 1995;30(3):491-494. doi:10.1016/0022-3468(95)90064-0.
- Taguchi T, Suita S, Masumoto K, Nagasaki A. An abnormal distribution of C-kit positive cells in the normoganglionic segment can predict a poor clinical outcome in patients with Hirschsprung's disease. *Eur J Pediatr Surg.* 2005;15(3):153-158. doi:10.1055/s-2005-837612.



This work is licensed under a Creative Commons Attribution

Bali Medical Journal



BALI MEDICAL JOURNAL

DISCOVERSYS INC., CANADA ON BEHALF OF SANGLAH GENERAL HOSPITAL IN COLLABORATION TO INDONESIA PHYSICIAN FORUM AND INDONESIA COLLEGE OF SURGEONS, BALI, INDONESIA & UDAYANA

P-ISSN : 23022914 E-ISSN : 25286641 Subject Area : Health

1.75424

Impact Factor

3522

Google Citations

Sinta 1

Current Accreditation

[Google Scholar](#)

[Garuda](#)

[Website](#)

[Editor URL](#)



RSUD Dr. SOETOMO
BUILD TRUST

**KOMITE ETIK PENELITIAN KESEHATAN
RSUD Dr. SOETOMO SURABAYA**

**KETERANGAN KELAIKAN ETIK
(" ETHICAL CLEARANCE ")**

0461/KEPK/VIII/2022

**KOMITE ETIK RSUD Dr. SOETOMO SURABAYA TELAH MEMPELAJARI
SECARA SEKSAMA RANCANGAN PENELITIAN YANG DIUSULKAN, MAKA
DENGAN INI MENYATAKAN BAHWA PENELITIAN DENGAN JUDUL :**

**" HUBUNGAN ANTARA JUMLAH SEL INTERSISIAL CAJAL DENGAN POLA
DEFEKASI PADA PASIEN DENGAN HIRSCHSPRUNG'S DISEASE PASKA
TINDAKAN OPERASI DUHAMEL DI RSUD DR. SOETOMO "**

PENELITI UTAMA : Dr. IGB Adria Hariastawa, dr., Sp.B, Sp.BA(K)

**PENELITI LAIN : 1. dr. Fendy Matulatan, Sp.B, SubBPed (K)
2. dr. Yohanes Santosa Honggowarsito**

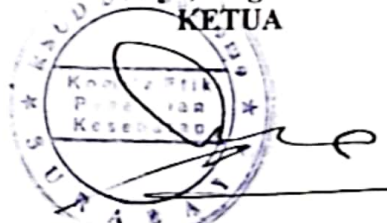
UNIT / LEMBAGA / TEMPAT PENELITIAN : RSUD Dr. Soetomo

DINYATAKAN LAIK ETIK

Berlaku dari : 04/08/2022 s.d 04/08/2023

Surabaya, 4 Agustus 2022

KETUA



(Prof. Dr. Hendy Hendarto, dr., SpOG (K))

NIP. 19610817 201601 6 101

****) Sertifikat ini dinyatakan sah apabila telah mendapatkan stempel asli dari Komite Etik
Penelitian Kesehatan***