3DMax™ Mesh Family

Clinical Compendium

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Year	Author	Title with Links	Journal	Number of Patients	Mean Follow-Up	Technique topics: Open, TAPP, TEP, Lap, Robotic comparisons, learning curve	Post op outcomes: QoL, Pain, Seroma, Recurrence, etc.	Fixation methods, Non fixation	Mesh comparison, Mesh evaluation	Cost citation
2025	F. Köckerling, S. H. Williams, C. C. Steele, H. Riediger, A. Badhwar, D. Adolf	Comparison of short- and long-term outcomes using heavy- (3DMax™Mesh) and lightweight (3DMax™ LightMesh) mesh in inguinal hernia repair	Eur Surg. 2025	3DMax™ Mesh: 2420 3DMax™ Light: 9033 (11453)	1 year	TAPP, TEP	No significant difference in postoperative complications between Light and regular 3DMax.	Majority no mesh fixation.	Light weight x heavy weight	
2024	V. C. Nikolian, X. Pereira, L. Arias-Espinosa, A. N. Bazarian, C. G. Porter, J. R. Henning, F. Malcher	Primary abandonment of the sac in the management of scrotal hernias: a dual-institution experience of short-term outcomes	Hernia https://doi.org/10.1007/s10029-024-03009-9	67	3, 6, 12 months	Robotic TAPP in scrotal hernias, abandon the sac.	Seroma/hematoma with no proc intervention 23.9%			
2024	Hayward, Romilly, Jacob J. Smith, Christos Kontovounisios, Shengyang Qiu, and Oliver J. Warren	Laparoscopic totally extraperitoneal hernia repair in patients with a history of previous abdominopelvic surgery	Front Surg. 2022 May 20:9:900843.	262	6 weeks	TEP - patients with or without history of previous abdominopelvic surgery	Haematoma 6.2% and seroma 4.1%. Recurrence 1.6% of operations, 1.1% of hernias.			
2024	Shao, X., Cheng, T., Shi, J., Zhang, W., Li, J	The effect of internal orifice narrowing in laparoscopic inguinoscrotal hernia repair to prevent seroma formation: a prospective double-blind randomized controlled trial	Surg Endosc. 2024. 38:1823-1834	58	6 months	Internal orifice narrowing achieved by suturing x no narrowing	Lower seroma in the group with the orifice narrowed. 0 recurrenes, 0 chronic pain in both groups.			
2023	Yun Suk Choi , Kyeong Deok Kim , Moon Suk Choi, Yoon Seok Heo, Jin Wook Yi [*,†] and Yun-Mee Choe	Initial Experience of Robot-Assisted Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair by a Single Surgeon in South Korea	Medicina 2023, 59, 582.	100	Not specified	Robotic x Lap learning curve - TAPP	Lower pain score in the robotic group.			
2023	J. L. Faessen, E. S. R. Duijsings, E. G. Boerma, P. P. H. L. Broos, R. van Vugt & J. H. M. B. Stoot	The first experience with the Dextile anatomical mesh in laparoscopic inguinal hernia repair	Hernia (2023) 27:1203–1208	956	8 weeks (3 months for pain)		Similar complications rates intra and post op. Similar recurrence rates and chronic pain scores.		3DMax x Dextile	
2023	DL Lima, V Viscarret, R Nogueira, JPG Kasakewitch, R Berk, P Sreeramoju, F Malcher.	Does the Weight Matter? Short-Term Outcomes of Lightweight Versus Heavyweight Three-Dimensional Anatomical Mesh in Minimally Invasive Inguinal Hernia Repair	Journal of laparoendoscopic & advanced surgical techniques. Part A. 2023 Oct;33(10):944-948	447	90 days		Similar complications rates post op. 5 recurrences in each group. 1 SSI in the lightweight group. Not favor anyone.		Light weight x heavy weight	
2023	Xiao, Y., Zuo, X., Li, H., Zhao, Y., Wang, X.	Impact of titanium-coated polypropylene mesh on functional outcome and quality of life after inguinal hernia repair	Heliyon. 2023 Jun 29;9(7):e17691	658	2 years	Lichtenstein and Lap TAPP	Titanium-coated polypropylene mesh resulted in reduced foreign body sensation and chronic pain in activity within one year after TAPP surgery, significantly enhancing certain aspects of the patient's quality of life compared to polypropylene mesh.		Timesh light, Optilene LP, 3DMax.	

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2023	Jeroukhimov, Igor, Dykman, Daniel, Hershkovitz, Yehuda, Poluksht, Natan, Nesterenko, Vladimir, Yehuda, Amir Ben, Stephansky, Albert, Zmora, Oded	Chronic pain following totally extra-peritoneal inguinal hernia repair: a randomized clinical trial comparing glue and absorbable tackers	Langenbecks Arch Surg. 2023 May 12;408(1):190.	208	1 year		No differences in postoperative pain. When only severe pain was considered, glue resulted in less pain than tackers. 4 recurrences in the tacker group.	Glue (LIQUIBAND FIX 8 Neopharm) x Tackers (SECURE STRAP)		
2023	Jung, Sungwoo, Lee, Jin Ho, Lee, Hyung Soon	Early outcomes of robotic transabdominal preperitoneal inguinal hernia repair: a retrospective single-institution study in Korea	Journal of Minimally Invasive Surgery. 2023. 26:128	21	1 week + additional follow up as needed		2 minor post op complications, no recurrences. Mean hospitalization time 3.8 days.			Robotic cost-effectiveness requires further investigation.
2023	Zhuang, Lin, Li, Yuanjiu, He, Wei, Zhou, Xiaodong, Chen, Yan, Wang, Xiaozhong, Wang, Bo, Xu, Xuezhong, Wu, Kejia, Zhang, Qiutao	Therapeutic efficacy of programmed spatial anatomy of the myopectineal orifice in total extraperitoneal hernioplasty: a retrospective study	Scientific Reports. 2023 Feb 15;13(1):2711	121	6 months	TEP x TEP with programmed spatial anatomy of the myopectineal orifice	Less complications on the TEP with programmed spatial anatomy of the myopectineal orifice group.			
2023	ÖNER, M.	Comparison of Absorbable Tuckers and N-Butyl Cyanoacrylate Glue in Mesh Fixation for Laparoscopic Extraperitoneal Inguinal Hernia Repair: A Single General Surgeon's Experience	Namik Kemal Med J 2023;11(4):379-384	226	6 months		Less pain in the glue group. Same day discharge was higher in the glue group. 1 recurrence in each group.	Absorbable Tackers x N-Butyl Cyanoacrylate Glue		
2023	Elghadban, Hosam,Negm, Ahmed,Hisham, Islam,Elganash, Abd Elazim,Taki-Eldin, Ahmed	Fixation of Conventional Polypropylene Mesh Versus Non-fixation of 3D Mesh in Laparoscopic Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair: a Randomized Controlled Trial	Indian Journal of Surgery. Nov 2023	60	1 year		Mesh spreading time was shorter in 3D mesh group. Pain score higher in the flat mesh group. Post op pain similar in both groups. Chronic pain higher in the flat mesh group.	Lap TAPP - fixation with flat mesh x non fixation with 3DMax		
2022	Shi, Xiaoyu, Luan, Fengming	Clinical Data Analysis for Treatment of Adult Inguinal Hernia by TAPP or TEP	Front Surg. 2022 May 20:9:900843.	686	1 year	Lap TAPP x TEP	No significant differences in postoperative hospital stay, complications, and recurrence rates. TEP showed shorter operation time and post op pain.			

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2022	Shahraki, Masoud Sayadi, Mahmoudieh, Mohsen, Keleidari, Behrooz, Melali, Hamid, Sharbu, Zakaria	The Effect of Internal Mesh Fixation and External Fixation (Inguinal Hernia Truss) on Postoperative Complications in Patients with Inguinal Hernia Undergoing Totally Extraperitoneal Laparoscopic Hernioplasty	Adv Biomed Res. 2022 Jun 29:11:49	64	6 months		No significant differences in complications rates. Pain scores at1 week and1 month as well as the return to work were better with the truss (belt).	TEP with 2 fixation methods – mechanical fixation (3 absorbable tackers) and hernia truss (belt)		
2022	Salas-Parra, R. D., Lima, D. L., Pereira, X., Cavazzola, L. T., Sreeramoju, P., Malcher, F.	Robotic Inguinal Hernia Repair After Prostatectomy: How to Navigate Safely	Surgical Laparoscopy, Endoscopy and Percutaneous Techniques. 2022. 32:66-72	15	1 month	Robotic inguinal after prostatectomy	No major complications, no recurrences. 2 seromas and 1 haematoma reported.			
2022	Morito, Atsushi, Kosumi, Keisuke, Kubota, Tatsuo, Yumoto, Shinsei, Matsumoto, Takashi, Mima, Kosuke, Inoue, Mitsuhiro, Mizumoto, Takao, Miyanari, Nobutomo, Baba, Hideo.	Investigation of risk factors for postoperative seroma/hematoma after TAPP	Surgical Endoscopy. 2022. 36:4741-4747	359	Not specified		Internal inguinal hernia and hernia size ≥ 3 cm were considered risk factors for postop seroma/hematoma formation after TAPP. Seroma 16%, recurrence rate 0.3%.			
2022	Gutlic, Allan, Rogmark, Peder, Gutlic, Nihad, Petersson, Ulf, Montgomery, Agneta	Pain with sexual activity at 1 and 3 years: Comparing total extraperitoneal with Lichtenstein inguinal hernia repair in a randomized setting (TEPLICH trial)	Surgery. 2022. 172:1463-1470	243	3 years	TEP x Lichtenstein	Pain at sexual activity 35%, reduced to lower levels with both techniques, but not significantly different. QoL restored at 1 and 3 years. New pain at sexual activity in 8 patients (3.6%).			
2022	Suzuki, Y., Wakasugi, M., Mikamori, M., Tamaoka, K., Nakahara, Y., Tei, M., Furukawa, K., Ohtsuka, M., Masuzawa, T., Akamatsu, H	Long-term outcomes of single-incision versus multiport laparoscopic totally extra-peritoneal inguinal hernia repair: a single-institution experience of 186 consecutive cases	Surgery Today. 2022. 52:114-119	186	5 years	TEP single incision x multiport	No significant differences in recurrence rates, chronic pain, mesh feeling, movement limitation.			
2022	Katoh, R., Ogawa, H., Takada, T., Ozawa, N., Suga, K., Osone, K., Okada, T., Shiraishi, T., Sano, A., Sakai, M., Sohda, M., Shirabe, K., Tsushima, Y., Saeki, H.	Significance of routine preoperative prone computed tomography for predicting intractable cases of inguinal hernias treated by transabdominal preperitoneal repair	Medicine (United States). 2022. 101:E31917	48	1 month	Computed tomography scans in the prone position for predicting intractable cases of inguinal hernias before performing TAPP				
2022	Barta, B., Dumitras, M., Bucur, S., Giuroiu, C., Zlotea, R., Constantin, M. M., Madan, V., Constantin, T., Iorga, C. R.	Extraperitoneal Laparoscopic Approach in Inguinal Hernia-The Ideal Solution?	J Clin Med. 2022. 11:5652	493	10 days	Lap TAPP, Lap TEP, Open Lichtenstein	No intra-op complications. 10.23% post op complications and 0.40% recurrence in the TEP group.			

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2021	Bilezikian, JA; Tenzel, PL; Johnson, RG; Powers, WF; Hope, WW	A preliminary evaluation of two different meshes in minimally invasive inguinal hernia surgery	Surgical Endoscopy (2021) 35:1342–1347	24 (out of 48)	12 months		Robotic significantly increased insertion time regardless of mesh type. No significant difference in difficulty of placement. Meshes can be used interchangeably based on the surgeon's preference.		3DMax x Ultrapro	
2021	Phuoc Van Nguyen, Minh Quang Dao, Quyet Van Ha, Thuong Van Pham, Truong Van Nguyen, Thang Quyet Tran, Anh Thuy Tran, Son Ngoc Vu, Hien Van Nguyen	Laparoscopic Totally Extraperitoneal Repair Using Three-dimension Mesh to Treat Bilateral Inguinal Hernia in Adults	World Journal of Laparoscopic Surgery, VOLUME 14 , ISSUE 3 (September-December, 2021)	50	21.4 ± 11.8 months	Lap TEP in bilateral hernias	7 patients (14.0%) had intra-op complications. At one month 1 patient (2.1%) with chronic pain. No recurrences.			
2021	Wakasugi, M., Hasegawa, J., Ikeda, Y.	Single-incision laparoscopic totally extraperitoneal inguinal hernia repair with tumescent local anesthesia: report of more than 2000 procedures at a day-surgery clinic	Surgery Today. 2021. 51:545-549	2148	12 months	Feasibility and safety of single-incision in TEP with local anesthesia	All the patients left the clinic on the day of surgery. Complications in 6.5% of the patients, seromas in 6%, wound infections in 0.4%. No recurrences.			
2021	Takayama, Yuichi, Kaneoka, Yuji, Maeda, Atsuyuki, Takahashi, Takamasa, Kiriyama, Muneyasu, Seita, Kazuaki.	Short- and Long-Term Outcomes of Transabdominal Preperitoneal, Open Mesh Plug and Open Tissue Inguinal Hernia Repair	World Journal of Surgery. 2021. 45:730-737	1813	26 months	TAPP x Plug x Open	Lower post op complications and recurrence rates in the TAPP group. Patient satisfaction was higher in the TAPP group.			
2021	Lee, Kanghee, Lee, Jin Ho, Nam, Soomin, Chong, Jae Uk, Lee, Hyung Soon.	Outcomes of open versus single-incision laparoscopic totally extraperitoneal inguinal hernia repair using propensity score matching: A single institution experience	PLoS One. 2021 Jan 28;16(1):e0246189	477	1 day	Open x single-incision laparoscopic TEP	Operation time longer in the single incision TEP group. Urinary retention higher in the open group. Less pain and analgesics in the single incision TEP group.			
2021	Fang, Haizong, Lin, Ronggui, Lin, Xianchao, Lu, Fengchun, Yang, Yuanyuan, Wang, Congfei, Chen, Yanchang, Huang, Heguang.	Drainage decreases the seroma incidence in laparoscopic transabdominal preperitoneal (TAPP) hernia repair for large inguinoscrotal hernias	Asian Journal of Surgery. 2021. 44:544-548	246	12 and 17.5 months according to the group		Less seroma in the drainage group. Operation time, hospital stay, recurrence, chronic pain and other complications were similar in both groups.			
2021	Corthals, Simon, Van Cleven, Stijn, Uyttebroek, Ortwin, de Carvalho, Luis Abreu, Vanlander, Aude, Berrevoet, Frederik.	Quality of life after open versus laparoscopic preperitoneal mesh repair for unilateral inguinal hernias	Asian Journal of Surgery. 2021. 44:1266-1273	204	36.5 and 32 months according to the group		No differences in post op QoL between 2 groups (open x lap).			

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2021	J. M. Cabrera-Bermón, J. L. Cuba-Castro, C. Monje-Salazar, N. Martos-Rojas, F. Ramos-Muñoz y R. de Luna-Díaz	Laparoscopic inguinal hernia repair in major outpatient surgery. The time is now.	CIR MAY AMB. 2021. Vol 26, N.º 4	100	1 year	TEP learning curve				
2020	Acar, A; Kabak, I; Tolan, HK; Canbak, T	Comparison between Mesh Fixation and Non-Fixation in Patients Undergoing Total Extraperitoneal Inguinal Hernia Repair	Nigerian Journal of Clinical Practice ¦ Volume 23 ¦ Issue 7 ¦ July 2020	178	45 months		Operation time, early and late complications were similar in both groups. No fixation didn't increase morbidity neither recurrence rates.	TEP fixation x non fixation		
2020	Hou Haisheng1, Yang Li2, Yan Xiaowei1	Efficacy of 3DMax mesh versus common mesh for laparoscopic inguinal hernia repair	Chinese Journal of Tissue Engineering Research ›› 2020, Vol. 24 ›› Issue (28): 4588-4592.	142	2 years		The operation time, time to ambulation, hospitalization expense, seroma, pain sensation were lower in the 3DMax group. No differences in recurrence, complications and QoL.		3DMax x flat mesh	3DMax mesh can shorten operation time, decrease hospitalization expense and chronic pain.
2020	Alarcón, I., Balla, A., Soler Frías, J. R., Barranco, A., Bellido Luque, J., Morales-Conde, S.	Polytetrafluoroethylene versus polypropylene mesh during laparoscopic totally extraperitoneal (TEP) repair of inguinal hernia: short- and long-term results of a double-blind clinical randomized controlled trial	Hernia. 2020 Oct;24(5):1011-1018.	52	60 months		LP-PTFE has less postop discomfort and pain up to 3 months after surgery, without differences after that period. More difficulty in handling and recurrences occur even if not statistically significant.		ePTFE x 3DMax	
2020	Bajpai, R. R., Razdan, S., Sanchez-Gonzalez, M. A..	Simultaneous robotic assisted laparoscopic prostatectomy (RALP) and inguinal herniorrhaphy (IHR): proof-of-concept analysis from a high-volume center	Hernia. 2020. 24:107-113	143	36 months	Prostatectomy + IHR	No recurrences. Shows feasibility and advisability of repairing inguinal hernias encountered during prostatectomy.			
2020	Takayama, Yuichi, Kaneoka, Yuji, Maeda, Atsuyuki, Takahashi, Takamasa, Uji, Masahito	Laparoscopic transabdominal preperitoneal repair versus open mesh plug repair for bilateral primary inguinal hernia	Annals of Gastroenterological Surgery. 2020. 4:156-162	107	22 and 40 months according to the groups	TAPP x Plug in bilateral hernias	Operation time longer in TAPP group. Post op, recurrence and long-term complications not significantly different between the groups. Less pain medication in the TAPP group.			
2020	Aghayeva, Afag, Benlice, Cigdem, Bilgin, Ismail A., Bengur, Fuat B., Bas, Mustafa, Kirbiyik, Ebru, Aytac, Erman, Baca, Bilgi.	Laparoscopic totally extraperitoneal vs robotic transabdominal preperitoneal inguinal hernia repair: Assessment of short- and long-term outcomes	The International Journal of Medical Robotics and Computer Assisted Surgery. 2020 Aug;16(4):e2111	86	24 months	Lap TEP x Robotic TAPP				Robotic approach showed higher costs than lap TEP.

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2020	Kuge, Hiroyuki, Yokoo, Takashi, Uchida, Hideki, Yamaoka, Kentaro, Yoshikawa, Shusaku	Learning curve for laparoscopic transabdominal preperitoneal repair: A single-surgeon experience of consecutive 105 procedures	Asian journal of endoscopic surgery. 2020. 13:205-210	100	33.5 months	Lap TAPP learning curve				
2019	M.R. Arnold, K.M. Coakley, E.J. Fromke, S.A. Groene, T Prasad, P. D. Colavita, V.A. Augensterin, K.W. Kercher, B.T. Heniford	Long-term assessment of surgical and quality-of-life outcomes between lightweight and standard (heavyweight) three-dimensional contoured mesh in laparoscopic inguinal hernia repair.	Surgery. 2019 Apr;165(4):820-824.	1424	3D Max Light- 21.8 months, 3D Max- 17.2 months		Complications, recurrence and seroma similar in both groups.		Light weight x heavy weight	
2019	Gutlic, N., Gutlic, A., Petersson, U., Rogmark, P., Montgomery, A.	Randomized clinical trial comparing total extraperitoneal with Lichtenstein inguinal hernia repair (TEPLICH trial)	British Journal of Surgery, Volume 106, Issue 7, June 2019, Pages 845–855	480	3 years	Lap TEP x Lichtenstein	Not significant differences in pain, QoL and recurrence between the groups. Operation time, 30-day complications, mesh sensation favored TEP.			
2019	Ruze, Rexiati, Yan, Zhibo, Wu, Qunzheng, Zhan, Hanxiang, Zhang, Guangyong.	Correlation between laparoscopic transection of an indirect inguinal hernial sac and postoperative seroma formation: a prospective randomized controlled study	Surgical endoscopy. 2019. 33:1147-1154	159	3 months	Dissection x transection of the hernia sac	Seroma formation higher in the transected group. No significant difference in pain and resumption of activities.			
2019	Yan, Z., Liu, Y., Ruze, R., Xiong, Y., Han, H., Zhan, H., Wang, M., Zhang, G	Continuation of low-dose acetylsalicylic acid during perioperative period of laparoscopic inguinal hernia repair is safe: results of a prospective clinical trial	Hernia. 2019. 23:1141-1148	901	3 months	Perioperative low dose of acetylsalicylic acid	No significant difference on operative time, intra-operative bleeding volume, and the occurrence postoperative complications among two groups.			
2018	Tripodi D, Zhang X, Wan Y, Berhane I, Corral M	A Retrospective Analysis of Tack Use With Progrip™ Laparoscopic Self-Fixating Mesh and 3dmax™ Mesh in Outpatient Hospital Inguinal Hernia Repair Procedures	VALUE IN HEALTH 21(2018) S1–S268		Not specified				3DMax x ProGrip	3DMax reduced procedure time variability in the outpatient setting. 29% cost-savings for 3DMax.
2018	IqbalSaleemMir1,TajamulRashid2,IrfanNazirMir1*,SuhailNazir1,ImtiyazAli1,MansoorUl Haq1	Laparoscopic totally extraperitoneal repair of inguinal hernia using three-dimensional mesh: a 5 years experience at a tertiary care hospital in Kashmir, India	International Surgery JournalMirIS et al. Int Surg J. 2018 Mar;5(3):1016-1020	123	12 months (mean)	Lap TEP	Lap inguinal repair using 3D mesh is a viable alternative with minimal post-operative pain and recurrence. Using 3D mesh has a technical advantage of easy insertion in an anatomically correct position with minimal fixation.			

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2018	Iraniha, Andrew, Peloquin, Joshua	Long-term quality of life and outcomes following robotic assisted TAPP inguinal hernia repair	Journal of robotic surgery. 2018. 12:261-269	82	36 months	R-TAPP (outpatient)	R-TAPP appears to be technically feasible, reproducible and safe with low recurrence, low chronic pain and high health-related quality of life in the long term.			
2018	Nagahisa, Yoshio, Kawashima, Ryuju, Matsumoto, Ryu, Harada, Masaki, Hashida, Kazuki, Okabe, Michio, Kawamoto, Kazuyuki.	Feasibility of a novel tacking method of securing mesh in transabdominal preperitoneal inguinal hernia repair: Secure tacking against recurrence	Asian Journal of Endoscopic Surgery. 2018. 11:385-391	391	Not specified		No recurrences in the STAR procedure group. 4 in the conventional group.	TAPP fixation method (STAR)		
2018	Wang, Yu-huan, Fu, Jiong, Chen, Qing-feng, Wang, Dong-xu, Jiang, Wei, Chen, Zheng	Short-term effect of laparoscopic assisted total extraperitoneal repair with small-incision for large inguinal hernia in adults.	Biomedical Research 2018; 29 (9): 1768-1773	66	6 months	Lap TEP with small incision	Compared with the traditional TEP, intraoperative bleeding volume in lap assisted TEP with small incision is less, postoperative recovery is faster, pain and physiological stress are less.			
2018	Matsuda, Akihisa, Miyashita, Masao, Matsumoto, Satoshi, Sakurazawa, Nobuyuki, Kawano, Youichi, Kuriyama, Sho, Sekiguchi, Kumiko, Ando, Fumihiko, Matsutani, Takeshi, Uchida, Eiji	Laparoscopic transabdominal preperitoneal repair for strangulated inguinal hernia	Asian journal of endoscopic surgery. 2018. 11:155-159	33	30 days	Lap TAPP x open in strangulated hernias	TAPP for strangulated inguinal hernia is at least comparable to open hernioplasty via the anterior approach in short-term outcomes.			
2017	Kuldeep S, Anand S, Megha S	A prospective study comparing flat polypropylene mesh and 3D monofilament mesh in laparoscopic mesh hernioplasty.	International Journal of Contemporary Medicine Surgery and Radiology. 2017 2(2): 53-57	60	1-6 months		Complications and post op pain similar in both groups. No recurrences in both groups. Hospital stay was less in the 3D group.		Flat mesh x 3D shape	
2017	Golani, S., Middleton, P.	Long-term follow-up of laparoscopic total extraperitoneal (TEP) repair in inguinal hernia without mesh fixation	Hernia. 2017. 21:37-43	538	6 years		It demonstrates that fixation with tacks or glue is unnecessary for TEP repair of inguinal hernia.	Non fixation long term follow up.		
2017	Kalra, Tarun, Soni, Rajesh Kumar, Sinha, Ajit.	Comparing Early Outcomes using Non Absorbable Polypropylene Mesh and Partially Absorbable Composite Mesh through Laparoscopic Transabdominal Preperitoneal Repair of Inguinal Hernia	J Clin Diagn Res. 2017 Aug; 11(8): PC13–PC16	60	3 months		Less post op pain and quick return to work favored Ultrapro group. Lower seroma in the 3DMax group.		3DMax x Ultrapro	

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2017	Mommers, E. H. H., Hünen, D. R. M., van Hout, J. C. H. M., Guit, M., Wegdam, J. A., Nienhuijs, S. W., de Vries Reilingh, T. S..	Patient-reported outcomes (PROs) after total extraperitoneal hernia repair (TEP)	Hernia. 2017. 21:45-50	120	12 months		Patients recovered well after TEP repair with a good quality of life and fast restore of function. Patient well-being was lower than expected due to a 14% incidence of chronic pain.			
2017	Schjøth-Iversen, L., Refsum, A., Brudvik, K. W.	Factors associated with hernia recurrence after laparoscopic total extraperitoneal repair for inguinal hernia: a 2-year prospective cohort study.	Hernia, 21(5), 729-735	1047	2 years	TEP – factors impacting recurrence rate	Higher recurrence rate in TEP x open. Good surgical technique with precise dissection and correct placement of the mesh, may be key points to improve outcomes after TEP.			
2017	Sakon, M., Sekino, Y., Okada, M., Seki, H., Munakata, Y	Laparoscopic inguinal hernioplasty after robot-assisted laparoscopic radical prostatectomy	Hernia. 2017. 21:745-748	40	11.2 months	Prostatectomy + IHR	Blood loss volume was small, no intra and post op complications, no recurrences.			
2016	K. Tanoue, H. Okino, M. Kanazawa, K. Ueno	Single-incision laparoscopic transabdominal preperitoneal mesh hernioplasty: results in 182 Japanese patients	Hernia 2016 (20): 797-803	182	587 days	Single incision TAPP	Less acute and chronic postop pain, shorter convalescence, earlier return to daily activities, better cosmetic results, low or even improved complication x open.			
2016	Priyanka Tiwari, Juneed Lankar, Prasanna Kumar Reddy	Contoured 3D mesh in laparoscopic inguinal hernia repair: does it reduce inguinodynia?	MedCrave Online Journal of Surgery (MOJS)	48	3 months		No chronic pain. No patient reported swelling and recurrence on 3 month follow-up.		3DMax evaluation (pain)	
2016	Pradeep Prakash, Virinder Kumar Bansal, Mahesh Chandra Misra, Divya Babu, Rajesh Sagar,1 Asuri Krishna,2 Subodh Kumar, Vimi Rewari,3 and Rajeshwari Subramaniam3	A prospective randomised controlled trial comparing chronic groin pain and quality of life in lightweight versus heavyweight polypropylene mesh in laparoscopic inguinal hernia repair	J Minim Access Surg. 2016 Apr-Jun; 12(2): 154–161.	140	3 months		Early return to walking and driving in the LW group. The incidence of early post-operative pain, chronic groin pain and QOL and recurrences were comparable between groups.		Light weight x heavy weight	
2016	Ludwig, Wesley W., Sopko, Nikolai A., Azoury, Saïd C., Dhanasopon, Andrew, Mettee, Lynda, Dwarakanath, Anirudh, Steele, Kimberley E., Nguyen, Hien T., Pavlovich, Christian P	Inguinal Hernia Repair During Extraperitoneal Robot-Assisted Laparoscopic Radical Prostatectomy	Journal of endourology. 2016. 30:208-211	59	33 months	Prostatectomy + IHR	For men with prostate cancer and comorbid IH, RALP+TEP appears to be an appropriate surgical combination.			

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Year	Author	Title with Links	Journal	Number of Patients	Mean Follow-Up	Technique topics: Open, TAPP, TEP, Lap, Robotic comparisons, learning curve	Post op outcomes: QoL, Pain, Seroma, Recurrence, etc.	Fixation methods, Non fixation	Mesh comparison, Mesh evaluation	Cost citation
2015	M. Szymankiewicz, D. Bennett	An 8 Year Series Reporting the Success of an Un-fixated Bard 3D Max Mesh Laparoscopic TEPP Inguinal Hernia Repair Technique	BJS 2015; 102 (S1): 127-301	212	36 months		Chronic pain 4.1%. Chronic swelling 0.86%. Chronic numbness 0.3%. Superficial SSI 1.1% and mesh infection 0%. Recurrence 0.29% (1 case only).	TEP with non fixation		
2013	Ayiomamitis GD, Zaravinos A, Stathakis PC, Kouroumpas E, Georgiades P, Polymeneas G	Tacks-free Transabdominal Preperitoneal (TAPP) inguinal hernioplasty, using an anatomic 3-dimensional lightweight mesh with peritoneal suturing: pain and recurrence outcomes— initial experience	Surgical Laparoscopy, Endoscopy and Percutaneous Techniques. 2013. 23:e150-e155	32	12.4 months		No recurrences and the chronic pain is negligible	Lap TAPP - fixation with non fixation	3DMax Light evaluation with non fixation (pain)	
2013	Zhu J, Zhou Y, Yin YZ, Tian Y	Experience of transabdominal preperitoneal prosthesis for the treatment of inguinal hernia with Bard 3DMax™ patch for twenty-six patients	Journal of Xinjiang Medical University	26	25.5 months		1 refractory hernia, due to large hernia sac. 1 seroma. No serious complications such as neuralgia and intestinal obstruction occurred.		3DMax evaluation	
2013	M Wakasugi, H Akamatsu, M Tori, S Ueshima, T Omori, M Tei, T Masuzawa, T Nishida	Short-term outcome of single-incision laparoscopic totally extra-peritoneal inguinal hernia repair	Asian Journal Of Endoscopic Surgery, 2013: 143 -146	34	7.1 months	Single incision TEP	4 seromas treated in the conservative way, no recurrences or major complications.			
2013	Zhang WG, An WD, Hu YZ, Deng ZH	Laparoscopic inguinal hernia repair using an anatomically contoured three–dimensional mesh without fixation: an analysis of 47 cases	Journal of Dalian Medical University	47	20.5 months	Lap TAPP x tension-free	Hospitalization, time to normal activities, pain time in groin, complications in TAPP was more than those in the other group significantly. No significant difference in operation time and recurrence rate.			TAPP with 3DMax more expensive than tension-free.
2013	Buckley, F. Paul, Vassaur, Hannah, Monsivais, Sharon, Sharp, Nicole E., Jupiter, Daniel, Watson, Rob, Eckford, John.	Comparison of outcomes for single-incision laparoscopic inguinal herniorrhaphy and traditional three-port laparoscopic herniorrhaphy at a single institution	Surgical endoscopy. 2014. 28:30-35	205	Not specified	Single incision x three-port lap	Similar operative times, conversion and complication rates.			
2012	Wang ZY, Wang RY, Zhang SL, et al	Using Bard 3DMax™ Mesh in transabdominal preperitoneal laparoscopic repair: a report of 15 cases		15	6.5 months		1 haematoma, no chronic inguinal pain, foreign body sensation cases and no recurrences.		3DMax evaluation	
2012	HANG Yun, CHEN Xin, LI Jian-wen	Laparoscopic inguinal hernia repair: a report of 2056 cases		2056 (not all 3DMax)	35 days	Lap TAPP x TEP	Recurrence rate 0.24%, seroma 5.2%, urinary retention 1.4%. 3 severe complications.			

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2011	Gong, Ke, Zhang, Nengwei, Lu, Yiping, Zhu, Bin, Zhang, Zhanzhi, Du, Dexiao, Zhao, Xia, Jiang, Haijun.	Comparison of the open tension-free mesh-plug, transabdominal preperitoneal (TAPP), and totally extraperitoneal (TEP) laparoscopic techniques for primary unilateral inguinal hernia repair: a prospective randomized controlled trial	Surgical endoscopy. 2011. 25:234-239	164	15 months	Open plug x lap TAPP x lap TEP	Open group: Operating time significantly shorter, lower cost, higher pain scores, longer hospital stay and recovery time. No major complications or recurrence in any group. TAPP and TEP are superior in terms of less postoperative pain and faster recovery time.			Open repair will remain a practical solution in China because of its lower cost, short learning period, and need for no special equipment.
2011	Khaleal, Fadil, Berney, Christophe.	The role of fibrin glue in decreasing chronic pain in laparoscopic totally extraperitoneal (TEP) inguinal hernia repair: a single surgeon's experience	ANZ Journal of Surgery. 2011. 81:154-158	233	6 months		Chronic pain 0.43% (1 patient).	Glue		
2010	Li MJ, Hu YZ, Li JY, Xu P, Chen J, Wang CC	3DMax Mesh Fixation-free Laparoscopic Inguinal Hernia Repair: A report of 55 cases	China Journal of Endoscopy	55	14 months		1 case of scrotal seroma, 2 cases of mild pain after surgery. No recurrences.	Non fixation	3DMax evaluation	
2010	Jutte, Ewoud H., Cense, Huib A., Dur, Alphons H. M., Hunfeld, Michiel A. J. M., Cramer, Biron, Breederveld, Roelf S.	A pilot study for one-stop endoscopic total extraperitoneal inguinal hernia repair	Surgical endoscopy. 2010. 24:2730-2734	52	2 weeks	Endoscopic TEP				This clinical pathway reduces the number of patient visits to the hospital for and also suggests cost efficiency (day care center).
2009	Chen D-LL, J.; Zheng, C.	Clinical application of 3DMax patch in the laparoscopic inguinal hernia repair.	Chinese Journal of Practical Surgery	68	3-24 months		Lap inguinal repair has less trauma, with the advantages of fast recovery and low recurrence rate, the use of pre-formed 3DMax patch makes the operation easier and the incidence of complications is lower.		3DMax evaluation	
2008	Finley. D, Savatta. D, Rodriguez.E, Kopelan. A, Ahlering.T	Transperitoneal robotic-assisted laparoscopic radical prostatectomy and inguinal herniorrhaphy	J Robotic Surg (2008) 1:269–272 DOI 10.1007/s11701-007-0051-9	837	12.5 months	Prostatectomy + IHR	1 recurrence, 1 urinary leak. Inguinal herniorrhaphy done concurrently at the time of RALP is safe, with no added morbidity and should be routinely performed.			
2007	Lee, Benjamin C., Rodin, David M., Shah, Ketul K., Dahl, Douglas M.	Laparoscopic inguinal hernia repair during laparoscopic radical prostatectomy	BJU international. 2007. 99:637-639	40	10 months	Prostatectomy + IHR	2 urinary leaks, 2 pelvic lymphocele, 2 urinary catheter re-insertion, 1 deep venous thrombosis. No recurrences. LIHR is a successful and reliable way to treat symptomatic patients who are treated surgically for prostate cancer.			

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2006	Koch CA, Greenlee SM,Larson DR, HarringtonJR, Farley D	Randomized prospective study of totally extraperitoneal inguinal hernia repair: fixation versus no fixation of mesh	JSLS: Journal of the Society of Laparoendoscopic Surgeons. 2006. 10:457	40	19 months		Non fixation in lap TEP significantly reduces the use of postoperative narcotic analgesia, hospital length of stay, and postop urinary retention but does not lead to a significant reduction in postop pain. Eliminating tacks does not lead to an increased rate of recurrence.	Fixation x non fixation		
2004	Alfredo Moreno-Egea, MD; José Antonio Torralba Martínez, MD; Germán Morales Cuenca, MD; et al	Randomized Clinical Trial of Fixation vs Nonfixation of Mesh in Total Extraperitoneal Inguinal Hernioplasty	Arch Surg. 2004;139(12):1376-1379	170	24 months		Stapling the mesh in TEP offers no advantages and increases the cost of the process. Our results suggest the possibility of limiting the use of mesh fixation in TEPs to cases of direct bilateral hernias.	Fixation x non fixation		Fixation increases the cost.
2004	Feliu, X., Torres, G., Viñas, X., Martínez-Ródenas, F., Fernández-Sallent, E., Pie, J.	Preperitoneal repair for recurrent inguinal hernia: Laparoscopic and open approach	Hernia. 2004. 8:113-116	188	12 months	Preperitoneal open x lap	3 recurrences and post op complications with no significant difference between groups. TEP was faster and hospital stay shorter with significant difference between groups.			
2003	Bell RC, Price JG	Laparoscopic inguinal hernia repair using an anatomically contoured three-dimensional mesh	Surg Endosc. 2003. 17:1784-8	146	23 months		An anatomically contoured mesh for transabdominal preperitoneal hernia repair often requires no fixation, with minimal risk of neuropathy and less than a 0.5% patient-year recurrence rate. Recovery is excellent even with bilateral repair or some fixation.		3DMax evaluation	
1998	Pajotin P	Laparoscopic groin hernia repair using a curved prosthesis without fixation; a report on 500 cases	Le Journal de Coelio-Chirurgie	390	2 years		1 case of herniaplegia, 4 urinary infections due to the catheter, 4% seromas and haematomas, 1.2% epididymitis, mild pain after 3 months. Recurrence rate 1%.	Non fixation	3DMax evaluation	

3DMax™ Mesh **Indications.** Bard® 3DMax™ Mesh is indicated for use in the reinforcement of soft tissue where weakness exists, in the repair of inguinal hernias. **Contraindications.** 1. Do not use this mesh in infants, children, or pregnant women, whereby future growth may be compromised by use of such materials. 2. The use of this mesh has not been studied in pregnant or breastfeeding women. 3. Literature reports that there may be a possibility for adhesion formation when polypropylene is placed in direct contact with the bowel or viscera. **Warnings.** 1. The use of any synthetic mesh or patch in a contaminated or infected wound can lead to fistula formation and/or extrusion of the mesh. 2. If an infection develops, treat the infection aggressively. Consideration should be given regarding the need to remove the mesh. An unresolved infection may require removal of the mesh. 3. If unused mesh has been in contact with instruments or supplies used on a patient or contaminated with body fluids, discard with care to prevent risk of transmission of viral infections. 4. To prevent recurrences when repairing hernias, the mesh should be sized with appropriate overlap for the size and location of the defect, taking into consideration any additional clinical factors applicable to the patient. Careful attention to mesh fixation placement and spacing will help prevent excessive tension or gap formation between the mesh and fascial tissue. 5. The mesh is supplied sterile. Inspect the packaging to be sure it is intact and undamaged prior to use. 6. This mesh had been designed for single use only. Reuse, reprocessing, resterilization, or repackaging may compromise the structural integrity and/or essential material and design characteristics that are critical to the overall performance of the mesh and may lead to mesh failure which may result in injury to the patient. Reuse, reprocessing, resterilization, or repackaging may also create a risk of contamination of the mesh and/or cause patient infection or cross infection, including, but not limited to, the transmission of infectious diseases from one patient to another. Contamination of the mesh may lead to injury, illness or death of the patient or end user. 7. To avoid injury, careful attention is required if fixating the mesh in the presence of nerves, vessels, or the spermatic cord. Fastener penetration into underlying tissue containing nerves or blood vessels may result in the need for medical/surgical intervention, cause serious injury or permanent impairment to a body structure. **Precautions.** 1. Please read all instructions prior to use. 2. Only physicians qualified in appropriate surgical techniques should use this mesh. 3. Do not cut or reshape the Bard® 3DMax™ Mesh as this may affect its effectiveness. 4. It is recommended to use a 10 mm internal diameter trocar to introduce a medium Bard® 3DMax™ Mesh, and an 11 mm internal diameter trocar to introduce a large Bard® 3DMax™ Mesh. The size of the extra-large Bard® 3DMax™ Mesh may inhibit deployment through a trocar. Use an appropriately sized trocar to allow mesh to slide down the trocar with minimal force. If mesh will not easily deploy down the trocar, remove trocar and insert mesh through incision. Reinsert trocar. 5. If fixation is used, Bard® permanent or absorbable fixation devices or nonabsorbable monofilament sutures are recommended to properly secure the device. If other fixation devices are used, they must be indicated for use in hernia repair. 6. If fixation is used, care should be taken to ensure that the mesh is adequately fixated to the abdominal wall. If necessary, additional fasteners and/or sutures should be used. **Adverse Reactions.** Possible complications may include, but are not limited to, seroma, adhesions, hematomas, pain, infection, inflammation, extrusion, erosion, migration, fistula formation, allergic reaction, and recurrence of the hernia or soft tissue defect.

3DMax™ Light Mesh **Indications.** The 3DMax™ Light Mesh is indicated for use in the reinforcement of soft tissue where weakness exists, in the repair of inguinal hernias. **Contraindications.** 1. Do not use this mesh in infants, children, or pregnant women, whereby future growth may be compromised by use of such materials. 2. The use of this mesh has not been studied in pregnant or breastfeeding women. 3. Literature reports that there may be a possibility for adhesion formation when polypropylene is placed in direct contact with the bowel or viscera. **Warnings.** 1. The use of any synthetic mesh or patch in a contaminated or infected wound can lead to fistula formation and/or extrusion of the mesh. 2. If an infection develops, treat the infection aggressively. Consideration should be given regarding the need to remove the mesh. An unresolved infection may require removal of the mesh. 3. If unused mesh has been in contact with instruments or supplies used on a patient or contaminated with body fluids, discard with care to prevent risk of transmission of viral infections. 4. To prevent recurrences when repairing hernias, the mesh should be sized with appropriate overlap for the size and location of the defect, taking into consideration any additional clinical factors applicable to the patient. Careful attention to mesh fixation placement and spacing will help prevent excessive tension or gap formation between the mesh and fascial tissue. 5. The mesh is supplied sterile. Inspect the packaging to be sure it is intact and undamaged prior to use. 6. This mesh had been designed for single use only. Reuse, reprocessing, resterilization, or repackaging may compromise the structural integrity and/or essential material and design characteristics that are critical to the overall performance of the mesh and may lead to mesh failure which may result in injury to the patient. Reuse, reprocessing, resterilization, or repackaging may also create a risk of contamination of the mesh and/or cause patient infection or cross infection, including, but not limited to, the transmission of infectious diseases from one patient to another. Contamination of the mesh may lead to injury, illness or death of the patient or end user. 7. To avoid injury, careful attention is required if fixating the mesh in the presence of nerves, vessels, or the spermatic cord. Fastener penetration into underlying tissue containing nerves or blood vessels may result in the need for medical/surgical intervention, cause serious injury or permanent impairment to a body structure. 8. This device is not for the use of repair of pelvic organ prolapse. 9. This device is not for the use of treatment of stress urinary incontinence. **Precautions.** 1. Please read all instructions prior to use. 2. Only physicians qualified in appropriate surgical techniques should use this mesh. 3. Do not cut or reshape the 3DMax™ Light Mesh as this may affect its effectiveness. 4. Use an appropriately sized trocar to allow mesh to slide down the trocar with minimal force. 5. If fixation is used, Bard® permanent or absorbable fixation devices or nonabsorbable monofilament sutures are recommended to properly secure the device. If other fixation devices are used, they must be indicated for use in hernia repair. 6. If fixation is used, care should be taken to ensure that the mesh is adequately fixated. If necessary, additional fasteners and/or sutures should be used. **Adverse Reactions.** Possible complications may include, but are not limited to, seroma, adhesions, hematomas, pain, infection, inflammation, extrusion, erosion, migration, fistula formation, allergic reaction and recurrence of the hernia or soft tissue defect.

3DMax™ MID Anatomical Mesh **Indications.** The 3DMax™ MID Anatomical Mesh is indicated for use in the reinforcement of soft tissue where weakness exists in the repair of inguinal hernias. **Contraindications.** 1. Do not use this mesh in infants, children or pregnant or breastfeeding women, whereby future growth may be compromised by use of such mesh material. 2. Literature reports that there may be a possibility for adhesion formation when polypropylene mesh is placed in direct contact with the bowel or viscera. **Warnings.** 1. The use of any permanent mesh or patch in a contaminated or infected wound could lead to fistula formation and/or extrusion of the mesh. 2. If an infection develops, treat the infection aggressively. Consideration should be given regarding the need to remove the mesh. An unresolved infection may require removal of the mesh. 3. If unused mesh has been in contact with instruments or supplies used on a patient or contaminated with bodily fluids, discard mesh with care to prevent risk of transmission of viral infections. 4. To prevent recurrences when repairing hernias, the mesh should be sized with appropriate overlap for the size and location of the defect, taking into consideration any additional clinical factors applicable to the patient. Careful attention to mesh fixation placement and spacing will help prevent excessive tension or gap formation between the mesh and fascial tissue. 5. This mesh is supplied sterile. Inspect the packaging to be sure it is intact and undamaged prior to use. 6. This mesh has been designed for single use only. Reuse, reprocessing, resterilization or repackaging may compromise the structural integrity and/ or essential material and design characteristics that are critical to the overall performance of the mesh and may lead to mesh failure which may result in injury to the patient. Reuse, reprocessing, resterilization or repackaging may also create a risk of contamination of the mesh and/or cause patient infection or cross infection, including, but not limited to, the transmission of infectious diseases from one patient to another. Contamination of the mesh may lead to injury, illness or death of the patient or end user. 7. To avoid injury, careful attention is required if fixating the mesh in the presence of nerves, vessels or the spermatic cord. Fastener penetration into underlying tissue containing nerves or blood vessels may result in the need for medical/surgical intervention, cause serious injury or permanent impairment to a body structure. 8. This device is not for the use of repair of pelvic organ prolapse. 9. This device is not for the use of treatment of stress urinary incontinence. **Precautions.** 1. Please read all instructions prior to use. 2. Only physicians qualified in appropriate surgical techniques should use this mesh. 3. Do not cut or reshape the 3DMax™ MID Anatomical Mesh as this may affect its effectiveness. 4. Use an appropriately sized trocar to allow mesh to slide down the trocar with minimal force. **Adverse Reactions.** Possible complications may include, but are not limited to, seroma, adhesion, hematoma, pain, infection, inflammation, extrusion, erosion, migration, fistula formation, allergic reaction, wound dehiscence and recurrence of the hernia or soft tissue defect.

Please consult package inserts for more detailed safety information and instructions for use.
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