

Trends in Immediate Postmastectomy Breast Reconstruction in the United Kingdom

Daniel R. Leff, FRCS, PhD*†§
 Alex Bottle, PhD‡
 Erik Mayer, FRCS, PhD*
 Darren K. Patten, MRCS,
 BSc*
 Christopher Rao, MRCS,
 PhD*
 Paul Aylin, MBChB, FFPHM‡
 Dimitri J. Hadjiminias, MPhil,
 FRCS§
 Thanos Athanasiou, MD,
 PhD, FECTS, FRCS*
 Ara Darzi, MD, FRCS, FACS,
 FMedSci*
 Gerald Gui, MS, FRCS, FRCS
 (Ed)†

Background: The study aimed to evaluate local and national trends in immediate breast reconstruction (IBR) using the national English administrative records, Hospital Episode Statistics. Our prediction was an increase in implant-only and free flap procedures and a decline in latissimus flap reconstructions.

Methods: Data from an oncoplastic center were interrogated to derive numbers of implant-only, autologous latissimus dorsi (LD), LD-assisted, and autologous pedicled or free flap IBR procedures performed between 2004 and 2013. Similarly, Hospital Episode Statistics data were used to quantify national trends in these procedures from 1996 to 2012 using a curve fitting analysis.

Results: National data suggest an increase in LD procedures between 1996 ($n = 250$) and 2002 ($n = 958$), a gradual rise until 2008 ($n = 1398$) followed by a decline until 2012 ($n = 1090$). As a percentage of total IBR, trends in LD flap reconstruction better fit a quadratic ($R^2 = 0.97$) than a linear function ($R^2 = 0.63$), confirming a proportional recent decline in LD flap procedures. Conversely, autologous (non-LD) flap reconstructions have increased (1996 = 0.44%; 2012 = 2.76%), whereas implant-only reconstructions have declined (1996 = 95.42%; 2012 = 84.92%). Locally, 70 implant-assisted LD procedures were performed in 2003-2004, but only 2 were performed in 2012 to 2013.

Conclusions: Implants are the most common IBR technique; autologous free flap procedures have increased, and pedicled LD flap procedures are in decline. (*Plast Reconstr Surg Glob Open* 2015;3:e507; doi: 10.1097/GOX.0000000000000484; Published online 4 September 2015.)

Immediate breast reconstruction (IBR) is associated with improved quality of life, body image, self-esteem, and confidence^{1,2} and has become an increasingly popular choice among patients

undergoing mastectomy.^{2,3} IBR techniques fall into 2 broad categories: (1) implant-only reconstruction performed either as a two-stage procedure with tissue expansion followed by exchange for a fixed-volume implant or as a single-stage direct to fixed-volume implant procedure and (2) autologous reconstruction necessitating either pedicled flaps [eg, latissimus dorsi (LD) myocutaneous flap] or free tissue transfer [eg, deep inferior epigastric perforator (DIEP) flap]. Of the autologous approaches to IBR, the LD myocutaneous flap, often regarded as the ‘workhorse’ of reconstructive breast surgery in the United Kingdom, has enjoyed popularity owing to its relative simplicity and versatility. In suitable candidates, an extensive dissection to maximize tissue harvest can facilitate an entirely autologous

From the *Department of BioSurgery and Surgical Technology, Imperial College London, London, United Kingdom; †The Breast Unit, Department of Academic Surgery, Royal Marsden NHS Foundation Trust, London, United Kingdom; ‡Dr Foster Unit, Imperial College London, London, United Kingdom; and §The Breast Unit, Department of Surgery, Imperial Healthcare NHS Trust, London, United Kingdom. Received for publication April 17, 2015; accepted July 13, 2015.

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reconstruction, known as the “extended LD,” which avoids complications of abdominal tissue harvesting such as abdominal bulge and hernia. A more common strategy is to use the LD muscle flap to provide additional soft-tissue coverage for implant-based reconstruction (implant-assisted LD), with the goal of superior cosmetic outcomes when compared with musculofascial coverage utilizing the pectoralis major and serratus anterior muscles in isolation. With the development of microvascular surgery enabling fasciocutaneous flaps to be raised, sparing muscle pedicles to derive its blood supply, an intuitive prediction of practice trends would be a reduction in the number of procedures associated with muscle harvest such as the LD, given its attendant morbidity.

Donor-site complications that arise after IBR with the LD include donor-site seroma, pain from scarring,^{4–8} and muscle weakness of the shoulder girdle.^{9–11} Improvements in the reliability, durability, and consistency of IBR using free flaps such as the DIEP flap have resulted in better complication profiles of autologous reconstruction.¹² The addition of acellular dermal matrices (ADM) to implant reconstruction facilitates a single-stage “direct to implant” procedure,¹³ by improving implant cover, better inframammary fold definition, and reducing capsule formation after prosthetic BR.¹³ In our practice, we have observed patients selecting expander or implant reconstruction, with or without ADM, or alternatively autologous techniques involving abdominal tissue transfer, rather than the LD per se.

Our hypothesis is that a recent shift has occurred toward a pattern of IBR practice that is less reliant on the LD flap. Declining trends in IBR techniques has important implications for councils for graduate medical education in establishing benchmark caseloads for residents to be credentialed in reconstructive surgery and may help inform commissioning of reconstructive services. To test our hypothesis, an analysis of the number of IBR procedures performed every year over the last 10 years was conducted using data from our institution and a Hospital Episode Statistics (HES) database, which covers all National Health Service (NHS) hospitals in England, to evaluate similarities in IBR trends.

MATERIALS AND METHODS

Tertiary Center Referral Data

The Royal Marsden NHS Trust (RMH) is a specialist oncoplastic center, receiving approximately 1000 new breast cancer referrals and performing

approximately 150 IBR procedures every year. A search of the local procedure-coded database and administrative systems at this institution was conducted to identify patients undergoing mastectomy and immediate reconstruction from April 1, 2003, to July 31, 2013. Similar search criteria were used to interrogate national data available from HES (Table 1). Crude procedural numbers were derived and categorized according to the type of reconstructive procedure(s) based on specified sets of codes from the Office of Population Censuses and Surveys Classification of Surgical Operations and Procedures (OPCS-4).

HES and Data Extraction Methodology

Hospital Episode Statistics is an administrative data set that collates data pertaining to patients admitted to NHS hospitals in England. Admissions contain both diagnostic and up to 24 procedure fields, coded using the OPCS system. HES data were analyzed to include all patients undergoing mastectomy in combination with a reconstructive procedure between April 1, 1996, and April 1, 2013. Data were categorized according to the type of reconstructive procedure as defined in Table 1. The combination of mastectomy and simultaneous reconstruction ensured that the current analysis was restricted to practices in immediate reconstruction.

Procedures that included the OPCS code for LD flap (B29.1) without any other OPCS code were assumed to represent extended LD procedures. Implant-assisted LD procedures were identified by the presence of the OPCS code for LD flap in combination with any code for expanders, implants, and/or theater devices (S48.2, B30.1, B30.8, B30.9, T85.2, T86.2, T87.3, T91.1). Similarly, implant- or expander-only reconstructions were identified by the presence of their respective OPCS codes in the absence of other reconstruction codes. There is currently no OPCS code specific for ADM; hence, the frequency of ADM-based reconstruction could not be ascertained. Autologous tissue flaps were predominantly derived from the lower abdominal pannus; in accordance with modern surgical practice, we focused on DIEP reconstructions. However, the OPCS code specific for DIEP (B39.3) was employed only from March 2006 onward. Before March 2006, a single OPCS code (B29.3) was used to define reconstruction of the breast using “free” or “pedicled” transverse rectus abdominis myocutaneous (TRAM) flap, other specified reconstruction using lower abdomen, and unspecified reconstruction using the lower abdomen. We, therefore, describe these procedures as “abdominal flaps”; given procedural heterogeneity, the inability to dissect trends in different abdominal

Table 1. Categorization of Immediate Breast Reconstruction by OPCS codes

Reconstruction Category	Combination of OPCS Procedural Codes	OPCS-4 Codes
Latissimus dorsi	Reconstruction with latissimus dorsi	B29.1
Latissimus dorsi in combination with expander or implant	Reconstruction with latissimus dorsi Expander, implant, or theater device	B29.1 S48.2, B30.1, B30.8, B30.9, T85.2, T86.2, T87.3, T91.1
Expander-implant only	Expander	S48.2, B30.1, B30.8, B30.9, T85.2, T86.2, T87.3, T91.1
Abdominal tissue flap reconstruction	Free TRAM	B29.3 (OPCS4.2), B39.1 (OPCS4.4)
	Pedicled TRAM	B29.3 (OPSC4.2), B39.2 (OPCS4.4)
	Specified lower abdominal flap	B29.3 (OPSC4.2), B39.8 (OPCS4.4)
	Unspecified lower abdominal flap	B29.3 (OPSC4.2), B39.9 (OPCS4.4)
	DIEP	B29.3 (OPCS 4.2), B39.3 (OPCS 4.4)
Abdominal tissue flap in combination with expander or implant	Expander, implant, or theater device	S48.2, B30.1, B30.8, B30.9, T85.2, T86.2, T87.3, T91.1
	Reconstruction using flap of skin abdomen	B29.3
	DIEP	B29.3 (OPCS 4.2) B39.3 (OPCS 4.4)
	Free TRAM	B29.3 (OPCS4.2), B39.1 (OPCS4.4)
	Pedicled TRAM	B29.3 (OPSC4.2), B39.2 (OPCS4.4)
	Specified lower abdominal flap	B29.3 (OPSC4.2), B39.8 (OPCS4.4)
	Unspecified lower abdominal flap	B29.3 (OPSC4.2), B39.9 (OPCS4.4)
	Reconstruction using gluteal flap	B38.1, B38.2, B38.8, B38.9
	Reconstruction using abdominal flaps including DIEP	B39.1, B39.2, B39.3, B39.4, B39.5, B39.8, B39.9, B29.3
	Other specified reconstruction	B29.8

*Interrogated for HES data only.

flap procedures and the nature of hypothesis, that is, trends in LD versus autologous abdominal flap procedures. There is currently no OPCS code for transverse gracilis myocutaneous flap and therefore a code describing breast reconstruction “other specified” (B29.8) was used. Bilateral procedures were not considered separately.

Curve Fitting Analysis

Curve fitting is a method for finding the best-fit line to a set of data points. Lines of “best-fit” were computed to determine whether trends in the proportion of LD flap reconstruction better fit a linear or quadratic, that is, parabolic, function. If as predicted, free flap and implant-only reconstructions have increased and as a proportion of total IBR practice LD flap reconstructions have decreased, then the data should better fit a quadratic than a linear function. Data were analyzed using IBM SPSS Statistics (Version 22, IBM).

RESULTS

Local Specialist Center

As illustrated in Figure 1 and Table 2, a steady decline in the number of IBRs involving LD flap harvest at our institution was observed. For example, in the year 2004–2005, the unit performed 70 postmastectomy LD-assisted reconstructions (of 125 IBRs); by 2009–2010, this figure had already fallen to 18 (of 155 IBRs); and by 2012–2013, only 2 procedures (of 176 IBRs) involved an implant-assisted LD flap. By comparison, over the same time period,

implant-only and autologous abdominal flap procedures increased. In 2004–2005, 35 expander-implant procedures and 11 DIEP reconstructions were performed at the RMH, and by 2012–2013, the annual number of these procedures had increased to 98 and 67, respectively. In 2003–2004, LD-assisted reconstructions represented just over half (54%) of total IBR practice volume at the RMH, whereas in

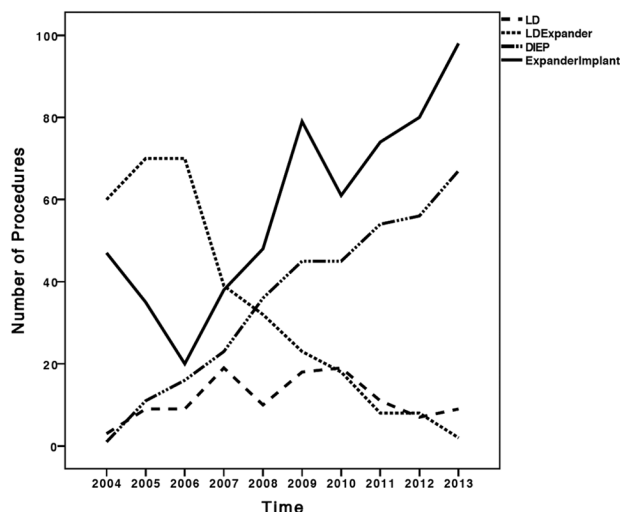


Fig. 1. Longitudinal variation in subcategories of immediate breast reconstruction performed at the Royal Marsden NHS Foundation Trust 2004–2013. Data episodes arranged sequentially according to financial year(s), such that 2004 data = number of reconstructive procedures performed from April 5, 2003, to April 5, 2004; 2005 data = April 5, 2004, to April 5, 2005, etc. LD Expander indicates latissimus dorsi plus expander/implant.

Table 2. Trends in Immediate Breast Reconstruction 2003–2013 at the Royal Marsden NHS Foundation Trust

Reconstructive Procedure	Episode of Interest [Data represent <i>n</i> = (% of total IBR practice volume)]											
	2003–2004	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013		
LD	3 (2.70)	9 (7.20)	9 (7.83)	19 (15.97)	10 (6.49)	18 (10.90)	19 (12.26)	11 (6.32)	7 (4.61)	9 (5.11)		
LD and expander	60 (54.01)	70 (56.0)	70 (60.87)	39 (32.77)	32 (20.78)	23 (13.94)	18 (11.61)	8 (3.38)	8 (5.26)	2 (1.14)		
Abdominal tissue flap	1 (0.90)	11 (8.8)	16 (13.91)	23 (19.34)	36 (23.38)	45 (27.27)	57 (36.77)	54 (36.49)	56 (36.84)	67 (38.07)		
Abdominal tissue flap and expander	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.65)	0 (0)	0 (0)	1 (0.68)	1 (0.66)	0 (0)		
Implant only	47 (42.34)	35 (28.0)	20 (17.40)	38 (31.93)	48 (31.17)	79 (47.88)	61 (39.35)	74 (50.0)	80 (52.64)	98 (55.68)		
Total	111	125	115	119	154	165	155	148	152	176		

2012–2013, it represented only 1%. Conversely, as a proportion of total practice volume, DIEP flap reconstructions have substantially increased from 9% in 2003–2004 to 38% in 2012–2013.

National Hospital Episode Data

To distinguish between local practice variations and a national epidemiological shift, HES data were interrogated to determine whether a decline in LD reconstruction was mirrored across units in England. HES data (Table 3) suggest that the numbers of IBR have doubled from 8389 in 1996 to 16,430 in 2012. As a percentage of immediate IBR practice, year on year, expander/implant reconstructions remain the most frequently practiced procedure (ie, accounting for >85% of IBR volume). However, longitudinal trends suggest a proportional increase in DIEP flap reconstructions (1996 = 0.44%, 2007 = 1.37%, 2012 = 2.76%), a steady decline in implant-only reconstruction (1996 = 95.42%, 2007 = 87.17%, 2012 = 84.92%), and a more recent decline in LD flap procedures commensurate with local data (1996 = 2.89%, 2007 = 7.81%, 2012 = 6.22%). HES data suggest that between 1996 and 2012, LD reconstructions comprised <10% of all reconstructive practice. Even at the height of popularity (2008–2009), LD reconstructions represented only 8% of total IBR practice.

National Trend Analysis: Curve Fitting

As highlighted in Figure 2A, crude rates of LD-expander procedures have increased linearly. However, Figure 2B demonstrates that the proportion of LD reconstructions better fit a parabola rather than a linear function. The results of curve fitting confirm that the percentage of LD breast reconstruction better fits a quadratic ($R^2 = 0.97$; $p < 0.001$) as opposed to a linear function ($R^2 = 0.63$; $p < 0.001$). We further explored HES data by individual unit. Commensurate with local data, a declining trend in LD procedures (2003–2012) was identified for a number of NHS Trusts ($n = 33$). As illustrated in Figure 3A–D, this trend was observed in both oncological units and specialist oncological centers with same-site oncological and reconstruction services.

DISCUSSION

This study demonstrates that as a percentage of total IBR practice, immediate LD flap reconstructions are in substantial decline in specialist centers and in recent decline in the United Kingdom in general. Implant-only reconstruction remains the most frequently performed procedure, although autologous abdominal free tissue transfer has increased in popularity within specialist practice and the United

Table 3. National Trends in Immediate Breast Reconstruction 1996–2012

Year	Category of Reconstructive Breast Surgery																			
	LD Only				LD Plus Expander-Implant as % of Total IBR				Expander-Implant Only as % of Total IBR				Abdominal Flaps as % of Total IBR		Abdominal Flaps Plus Expander-Implant as % of Total IBR		Autologous Reconstruction (non-LD)		Autologous as % of Total IBR	
	LD Only	LD Plus Expander-Implant	Total LD Plus Expander-Implant	LD as % of Total IBR	LD Only	Expander-Implant Only	Total LD Plus Expander-Implant	Total LD as % of Total IBR	Expander-Implant Only	Implant as % of Total IBR	Abdominal Flaps	Total IBR	Abdominal Flaps as % of Total IBR	Abdominal Flaps Plus Expander-Implant	Total IBR	Autologous Reconstruction (non-LD)	Total IBR	Autologous as % of Total IBR	Total IBR	
1996	72	178	250	2.10	8005	8005	2.89	95.42	37	0.44	36	0.43	61	0.73	8389					
1997	109	237	346	2.64	8446	8446	3.71	94.12	45	0.50	41	0.46	96	1.07	8974					
1998	122	362	484	3.47	9737	9737	4.43	93.22	53	0.51	63	0.60	108	1.03	10445					
1999	137	436	573	3.88	10390	10390	4.85	92.40	81	0.72	74	0.66	127	1.13	11245					
2000	183	573	756	4.97	10418	10418	6.16	90.41	112	0.97	89	0.77	148	1.28	11523					
2001	198	615	813	5.06	11007	11007	6.26	90.49	94	0.77	111	0.91	139	1.14	12164					
2002	187	771	958	6.00	11534	11534	6.94	89.80	108	0.84	109	0.85	135	1.05	12844					
2003	203	830	1033	6.15	12092	12092	7.11	89.64	108	0.80	123	0.91	134	0.99	13490					
2004	213	822	1035	6.09	12200	12200	7.05	90.43	126	0.93	112	0.83	172	1.28	13645					
2005	234	983	1217	6.78	12810	12810	7.75	88.40	148	1.02	127	0.88	188	1.30	14490					
2006	226	971	1197	6.59	12980	12980	7.51	87.48	165	1.12	123	0.83	269	1.83	14734					
2007	220	1057	1277	7.01	13140	13140	7.81	87.17	206	1.37	138	0.92	313	2.08	15074					
2008	268	1130	1398	7.32	13252	13252	8.31	85.87	225	1.46	197	1.28	360	2.33	15433					
2009	288	1034	1322	6.53	13551	13551	7.70	85.54	292	1.84	242	1.53	435	2.75	15842					
2010	306	1108	1414	6.64	14181	14181	7.82	85.02	364	2.18	240	1.44	480	2.88	16679					
2011	291	1040	1331	6.24	13938	13938	7.45	83.57	429	2.57	241	1.44	604	3.62	16543					
2012	242	848	1090	5.16	13953	13953	6.22	84.92	454	2.76	316	1.92	617	3.74	16430					

Abdominal flaps = free TRAM, pedicled TRAM, DIEP, specified flap from abdomen, and unspecified flap from abdomen.

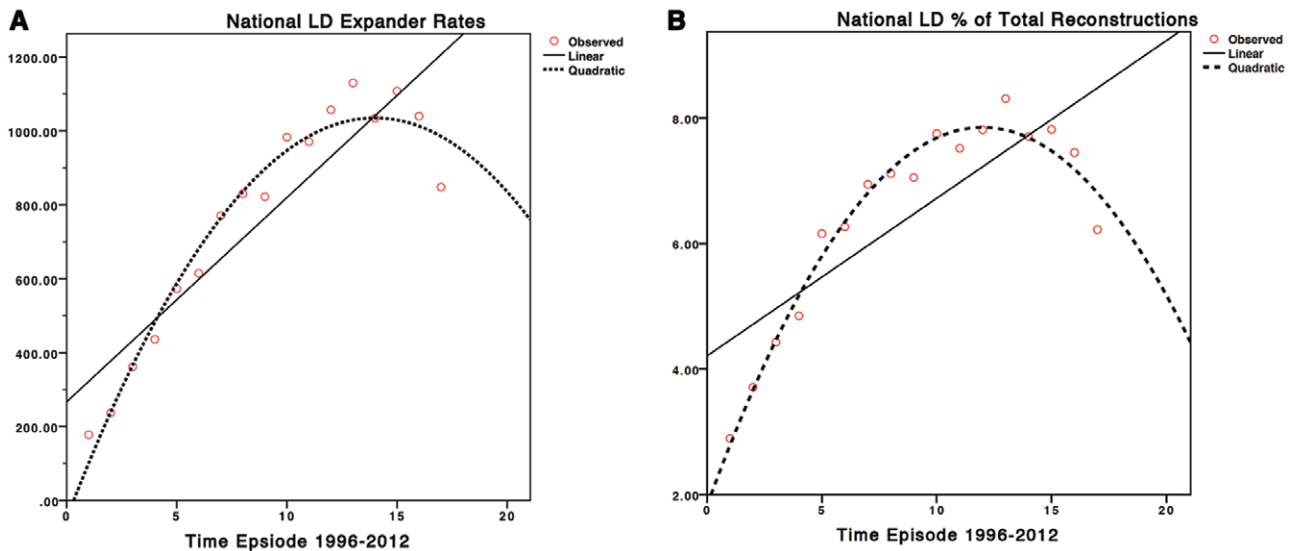


Fig. 2. Longitudinal trends in National LD flap immediate breast reconstruction rates for financial years 1996–2012. A, Charts highlight trends in LD-expander rates. B, Proportion of LD flap procedures expressed as a percentage of the total postmastectomy breast reconstruction load. Lines of “best-fit” for linear and quadratic functions are superimposed.

Kingdom at large. These findings are reinforced by our own observations of the choices patients are making for IBR. Indeed, in our oncoplastic center, the number of LD flap reconstructions and especially implant-assisted LD procedures has significantly dwindled. Explanations for these shifting patterns in reconstructive practice and comparisons with data regarding IBR practice in the United States merit further discussion.

Comparison between UK and US Postmastectomy Reconstructive Practice

Trends in IBR in the United States and United Kingdom are summarized, compared, and contrasted in Figure 4. Similar to the UK trends highlighted (Table 3), data from the Surveillance, Epidemiology, and End Results (SEER) database suggest that IBR is increasing.^{3,14} Indeed, a recent analysis of data from the National Inpatient Sample (NIS) database suggested that IBR rates have increased by 78%, from 20.8% in 1998 to 37.8% in 2008.¹⁴

Although data suggest that implant-based reconstruction remains popular on both sides of the Atlantic, figures from the United States suggest rates of autologous reconstruction that are either stable or in decline.^{14–16} For example, Alborno et al¹⁴ observed that although rates of autologous breast reconstruction were stable, implant reconstruction increased by approximately 11% per annum and a 5% year-on-year decrease in autologous reconstruction from 1998 to 2008.^{14,16} Similarly, Jagsi et al¹⁵ observed an increase in implant reconstruction and a corresponding decrease in the rate of autologous breast reconstruction from 56% in 1998 to 25% in

2007 and speculated that this might reflect patient preferences for simpler procedures, procedural complexity of microsurgical reconstruction, or financial disincentives that may complicate reconstructive decision making in the United States.¹⁵ For example, one study estimated that surgeons were reimbursed \$587 per hour for implants and \$322 per hour for autologous reconstructions. Others have suggested theater productivity and operating room bottlenecks may be to blame because in the time taken to conduct a free flap, several implant-based reconstructions may have been performed.¹⁴ The increase in bilateral mastectomy rates^{17,18} and the fact that bilateral (vs unilateral) was a predictor for implant reconstruction in the NIS study¹⁴ suggest that a desire for reconstructive symmetry may also play a role.

Finally, microsurgical skills training may be an issue. Kulkarni et al¹⁹ surveyed 500 active US members of the American Society of Plastic Surgeons and observed that only one fourth offered microsurgical reconstruction.¹⁹ This, notwithstanding, recent US data from Academic Institutions suggest patterns of reconstructive practice that more closely resemble the trends observed at the RMH.²⁰ Specifically, Dasari et al²⁰ identified an increase in autologous flap reconstruction from 2007 to 2013 and a longitudinal decline in LD reconstruction from 9.4 cases per surgeon in 2007 to 3.9 cases per surgeon in 2013.²⁰

Role of New Technologies and Improvements in Autologous Reconstruction

We suspect that the recent decline in the proportion of LD-based reconstruction observed both locally and nationally may be influenced by

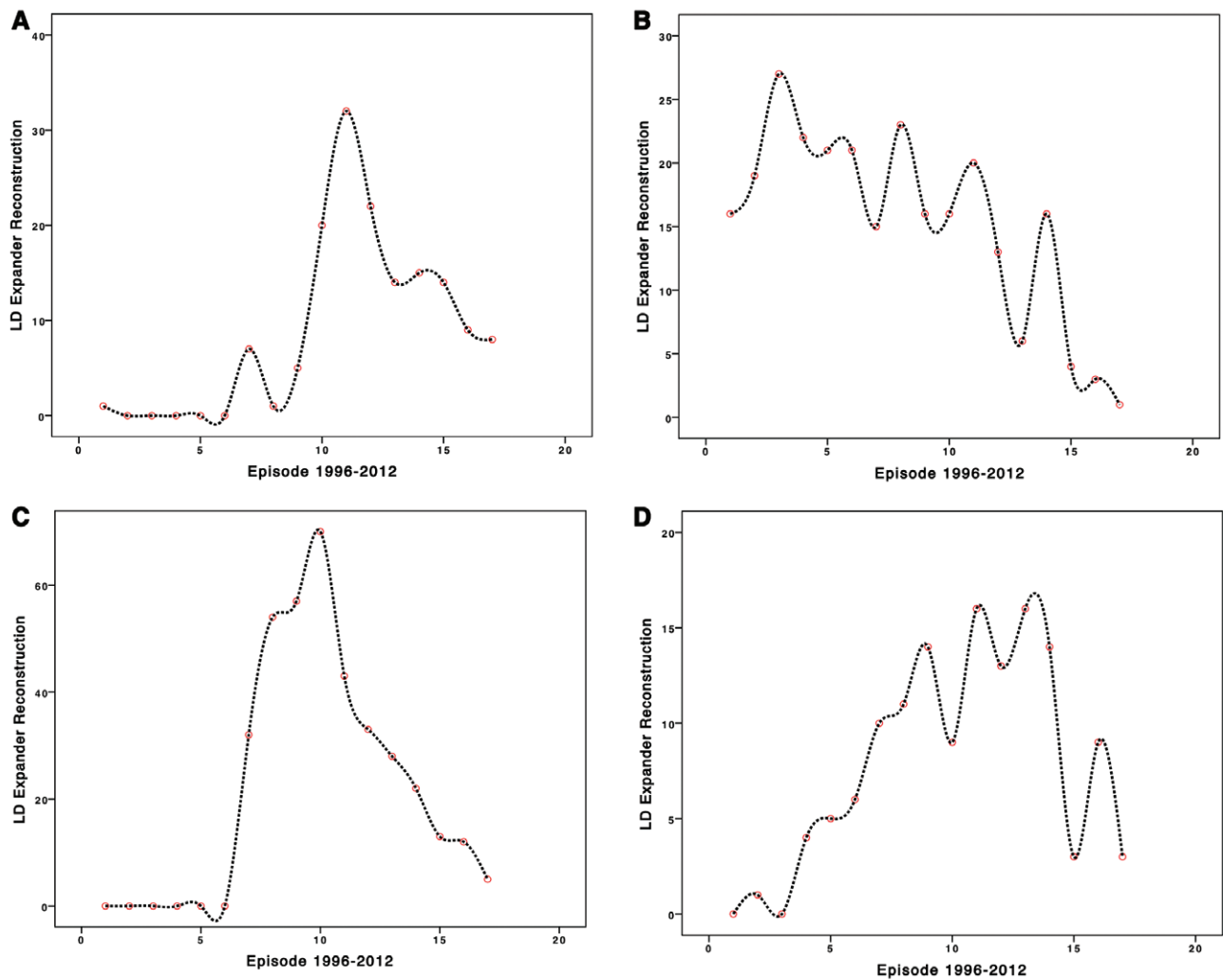


Fig. 3. Trends in the crude numbers of implant-assisted LD flap reconstructions across 4 UK NHS Trusts, 1996–2012. The plots for NHS Trusts reflect a similar trend to that observed at the Royal Marsden NHS Foundation Trust (2003–2012): RP5 Doncaster and Basseltow NHS Trust (A); RNZ Salisbury NHS Trust (B); RVJ North Bristol NHS Trust (C); and RYQ South London Healthcare NHS Trust (D).

technical improvements in both implant-only reconstruction and autologous abdominal techniques. The development of a range of ADMs that provide an extracellular scaffold to support musculofascial implant coverage enable revascularization and tissue integration as well as improving contour, shape, and ptosis is currently revolutionizing implant-based reconstruction. Emerging data suggest that implant reconstruction with ADM reduces the rates of capsular contracture and need for reoperative intervention and improves aesthetic outcomes versus two-stage submuscular tissue expansion.^{21,22} Proposals for systematic regulation of prostheses in the United Kingdom,²³ the increase in contralateral mastectomy rates (hence elevated morbidity incurred from bilateral LD harvest),²³ and evidence to support improved outcomes in the setting of radiotherapy²⁴ are likely to sustain the observed popularity in im-

plant-based reconstruction. Moreover, practical benefits include operating room utility and productivity. Critically, the operative time required for implant reconstruction using ADM is considerably shorter than that for an LD-based reconstruction.²⁵ Similarly, the introduction of the DIEP flap has improved the complication profile of abdominal free tissue transfer with far lower rates of abdominal weakness and bulge compared with the pedicled-transverse rectus abdominis myocutaneous (p-TRAM) flap¹² and superior patient satisfaction over LD reconstruction.²⁶

Complication Profile and Role of LD Flap Reconstruction in Modern Practice

Postoperative complications of LD-based IBR such as donor-site seroma formation,^{4–8} breast animation,^{27,28} and functional shoulder weakness^{9–11} may have seen the LD fall out of favor in certain local

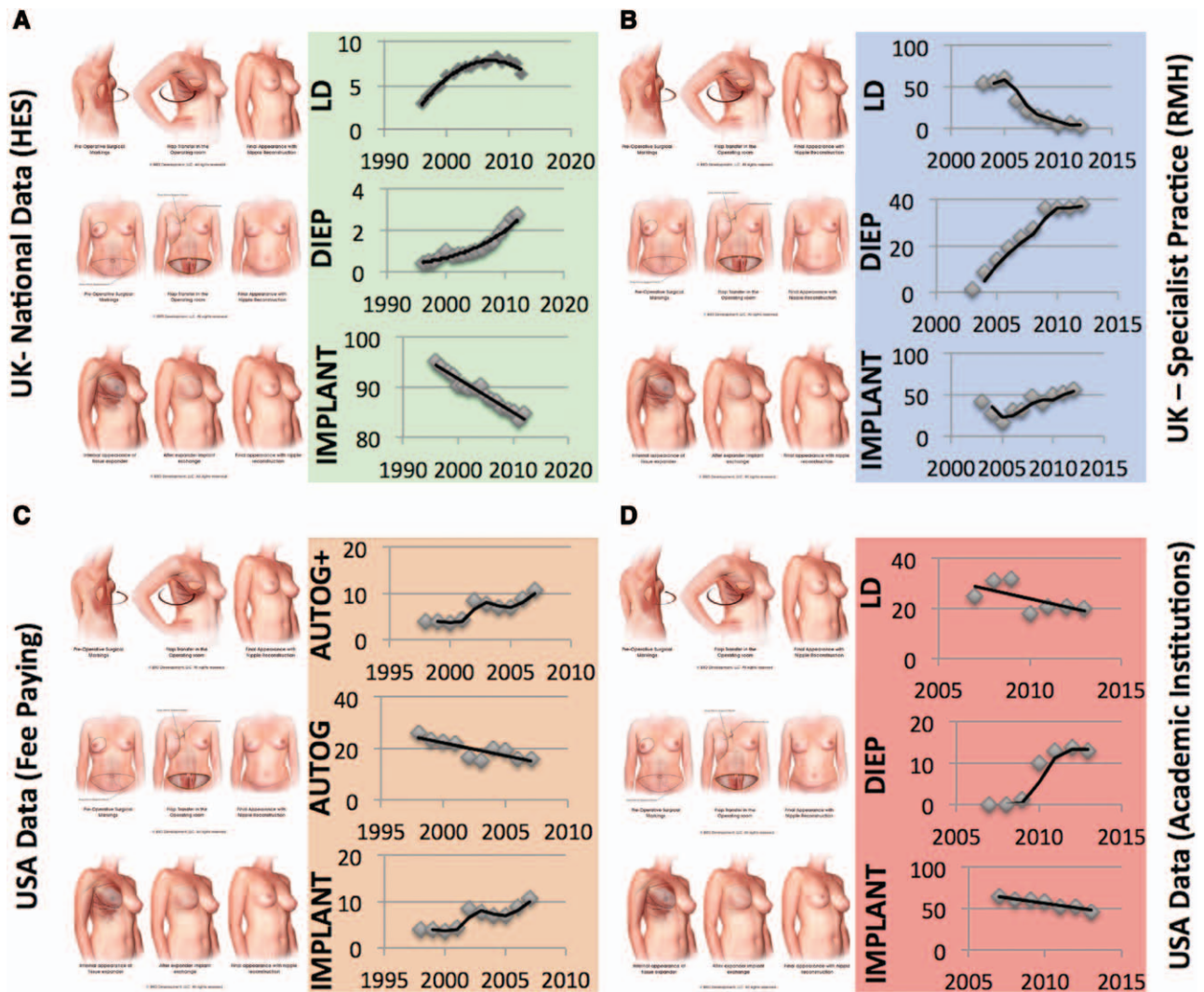


Fig. 4. Longitudinal trends in proportions (% of total IBR) of each subtype of breast reconstruction performed in United Kingdom and United States. Charts depict proportional decrease in LD- and implant-based reconstruction and increase in autologous free flap reconstruction (A), and the opposing trend observed in an insured population in the United States (C).²⁷ Conversely, the reduction in LD flap reconstruction and increase in DIEP or free flap microsurgery observed at the RMH (B) is mirrored in certain academic institutes in the United States (D).³⁰ Autog indicates autologous; autog+, autologous plus implant. Procedural schematic illustrations reproduced with permission from <http://www.breastreconstruction.org>.

centers and indeed in the United Kingdom nationally. Certainly, the results of curve fitting analysis suggest that there is a more recent decline in LD flap reconstruction. However, given that approximately 1000 LD flap reconstructions are performed every year (Table 3), a body of UK surgeons still believe that LD-based breast reconstruction has a role. In our view, there are specific circumstances in which deployment of the LD flap is especially useful. In particular, the extended LD flap provides an option for patients wishing to pursue autologous reconstruction, but in whom abdominal free tissue transfer is deemed unachievable (eg, damage to host perforators from previous abdominal surgery or slim individuals who lack a sufficient abdominal panniculus). Similarly, in

patients considered to be too high risk for free flap reconstruction (eg, morbid obesity, smokers, diabetics), the LD flap has a superior complication profile.²⁹

Patients undergoing extensive resection for locally advanced or locally recurrent breast cancer, with widespread cutaneous involvement or chest wall fixation require reconstruction to cover exposed vital structures, ensure timely closure to avoid delaying adjuvant therapy and improve quality of life.^{30,31} The LD flap is a useful salvage strategy in patients who have failed either implant-only reconstruction or autologous abdominal techniques. The LD “mini-flap” offers a tangible volume replacement option to maintain cosmesis in breast-conserving surgery,^{32,33} whereas endoscopic, robotic, muscle-sparing, and

scarless techniques may facilitate IBR while simultaneously limiting donor complications.^{34,35}

Strengths and Limitations

The strength of this study is in the ability to compare and contrast practice variation nationally, with those from a specialist oncoplastic center. There are recognized limitations intrinsic to administrative databases that may bias our results. Several codes were used for expanders and implants, and combinations of these codes often appeared in a single procedure. There is no code for ADM, which makes it impossible to confirm if the apparent popularity of implant-based reconstruction is being maintained by the benefits of this new technology. Finally, the absence of a DIEP-specific code before 2006 meant that any abdominal autologous reconstructions captured before that date were likely to reflect a heterogeneous combination of DIEP, TRAM, and/or superficial inferior epigastric artery (SIEA) flaps.

CONCLUSIONS

Implant-based breast reconstruction remains the most common reconstruction method in the United Kingdom. Autologous reconstruction with perforator flaps is more likely to be offered in specialist and academic institutions. A considerable number of LD flap reconstructions are still performed in England, which may reflect the access to such technical developments across the country leading to geographical variation in practice. Reconstructive surgeons should not be deskilled in LD flap reconstruction because it has a role in chest wall resurfacing, as a salvage reconstruction technique, and in patients deemed not to be suitable for either implant-only reconstruction or abdominal free-tissue transfer.

Gerald Gui, MS, FRCS, FRCS(Ed)

Consultant Oncoplastic Breast Surgeon
The Breast Unit, Department of Academic Surgery
Royal Marsden NHS Foundation Trust
London, United Kingdom
Gerald.gui@rmh.nhs.uk

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