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The impact of advancing age on postoperative outcomes in plastic surgery

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Abstract Age has been shown to be an independent predictor of complications in general surgery patients. In contrast, the effect of age on outcomes after plastic surgery has yet to be confirmed or refuted. The objective of the current investigation was to evaluate a possible association between age and postoperative outcomes after plastic surgery. The 2005–2012 NSQIP database was retrospectively reviewed for all patients undergoing plastic surgery. Patients ≥ 60 years with procedures under the category of plastic surgery in NSQIP were selected for analysis. The primary outcome of interest was 30-day overall complication rates. Multivariate regression models were constructed to control for potential perioperative confounders. Of the 2,320,920 patients captured in the NSQIP database, 36,819 patients underwent plastic surgery and met inclusion criteria. The incidence of unadjusted overall complications increased with age with an overall complication rate of 9.0% in patients < 60 years, 11.6% in patients 60–69 years, 13.2% in patients 70–79 years, and 15.9% in patients 80 or more years ($p < 0.001$). After adjusting for potential confounders, age was not independently associated with increased overall complications rates in patients 60–69 years (OR = 1.026; 95% CI = 0.927–1.135; $p = 0.619$) and 70–79 years (OR = 0.933; 95% CI = 0.797–0.919; $p = 0.393$), although patients 80 years and older experienced more medical complications (OR = 1.626; 95% CI = 1.218–2.172; $p = 0.001$). Age is not independently associated with overall worse outcomes in patients undergoing plastic surgery. Medical complications and mortality were more likely in extremes of age (> 80 years). Age alone should not be included as a decisional factor in patients < 80 years old considering plastic surgery.

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Introduction

Over one-third of all surgical procedures in the United States are performed on patients older than 65 years of age.¹ One-fourth of all cosmetic surgical procedures and one-third of breast reconstructions are currently performed on elderly patients.² However, elderly patients have increased morbidity after general surgery due to limited physiological reserve (frailty).^{3–6} In addition, elderly patients experience greater rates of inadequate healthy literacy and postoperative cognitive dysfunction and those conditions can also lead to poor health outcomes.^{7,8}

Age has been found to be an independent risk factor for post-operative complications in general surgery patients.^{9,10} In contrast, the overall effect of age on the incidence of postoperative complication for patients undergoing plastic surgery has yet to be quantified. In addition, previous studies evaluating the effect of age on postoperative complications in specific plastic surgery procedures have not distinguished morbidity according to surgical or medical complications.^{11,12} This distinction is important as it can lead to development of specific preventive strategies to minimize complications in elderly patients undergoing plastic surgery.

The main objective of the current investigation was to quantify the effect of age on overall postoperative complications in plastic surgical patients. We also sought to examine if age was an independent predictor for the development of surgical or medical complications.

Materials and methods

Data source and population

The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) registry from 2005 to 2012 was retrospectively reviewed for all patients undergoing plastic surgery. The details of the ACS-NSQIP data collection methods have previously been described in detail and validated.^{13,14} Patients who were categorized under the surgical specialty of plastic surgery in NSQIP were selected for analysis. Patients who were missing information for age were excluded.

Age, race, outpatient status, and BMI were included as part of patient demographics. Clinical characteristics examined included alcohol use, smoking, steroid use, radiotherapy in the prior 90 days, chemotherapy in the prior 30 days, previous operations in the prior 30 days, and ventilator dependence. Surgical case characteristics examined included emergency case status, average work RVU, and average operative time. Also identified were comorbidities including diabetes, dyspnea, hypertension, COPD, congestive heart failure, bleeding disorders, history of percutaneous coronary intervention (PCI), cardiac surgery, stroke, transient ischemic attack (TIA), hemiplegia, disseminated cancer, and ASA class. The most frequently performed procedures in each age group were identified based upon primary Current Procedural Terminology (CPT) code frequency (Table 1).

Primary outcomes

The primary outcome of interest was 30-day complication rates, categorized as surgical, medical, and overall complications. Surgical complications included surgical site infection (SSI), wound disruption, and reoperation. Surgical site infections (SSI) included superficial, deep, and organ space SSIs as classified by the NSQIP User Guide. Reoperation was defined as a return to the operating room within 30 days of the primary procedure. Medical complications examined included pneumonia, unplanned intubation, ventilator dependence greater than 48 h, progressive renal insufficiency, acute renal failure, urinary tract infections, peripheral neurologic deficiency, intraoperative or immediate postoperative transfusion requirement, pulmonary embolism, stroke, coma, cardiac arrest, myocardial infarction, deep vein thrombosis, sepsis, and septic shock. Any complication was defined as the total of one or more of the above events tracked by the NSQIP database.

Statistical analysis

While no generally agreed upon definition of old age exists, the World Health Organization defines old age as ≤ 60

Table 1 Most frequent plastic surgery procedures by age.

CPT	Description	
<60		
		<i>n</i> = 27,692
19318	Reduction mammoplasty	21.4%
19357	Breast reconstruction, with tissue expander	8.1%
15830	Panniculectomy	6.7%
60–69.9		
		<i>n</i> = 6108
19318	Reduction mammoplasty	13.9%
19357	Breast reconstruction, with tissue expander	8.6%
19380	Breast reconstruction revision	7.4%
70–79.9		
		<i>n</i> = 2178
19318	Reduction mammoplasty	13.9%
15734	Muscle, myocutaneous, fasciocutaneous flap; trunk	7.2%
19357	Breast reconstruction, with tissue expander	5.7%
80+		
		<i>n</i> = 841
15240	Full thickness skin graft, free, direct closure of donor site, forehead, cheeks, chin, mouth, neck, axillae, genitalia, hands, feet	8.0%
15220	Full thickness skin graft, free, direct closure of donor site, scalp, arms, legs	6.1%
15260	Full thickness skin graft, free, direct closure of donor site, scalp, arms, legs	5.9%

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