

Trends In Usage Of ACDF Implants Show Large Increase In Synthetic Cage Use Over Structural Allograft

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INTRODUCTION:

Anterior cervical discectomy and fusion (ACDF) is a common surgical procedure. After decompression, reconstruction is typically done with structural allograft or a synthetic cage. The present study aims to analyze relative trends and factors associated with the usage of these two types of implants in ACDF.

METHODS:

The PearlDiver 2011-2021 M157 database was used to identify adult patients undergoing one- or two-level ACDF. Exclusion criteria included: age < 18, receiving other cervical spine surgeries on the same day as ACDF, diagnosis of infection, neoplasm, or trauma within 90-days prior to surgery, or receiving ACDF for more than two levels. Mutually exclusive sub-cohorts were then defined: one where a structural allograft was the only structural interbody, and another where a synthetic cage was the only structural interbody.

Abstracted from the dataset were clinical factors (age, sex, and Elixhauser comorbidity index [ECI]), and non-clinical factors (geographic region [Midwest, Northeast, South, West], insurance plan [Commercial, Medicare, Medicaid], and surgeon specialty [orthopaedics and neurosurgery]). The incidence of structural allograft versus synthetic cage utilized was determined by year and compared using chi-squared tests. Patient factors predictive of synthetic cage use as the structural interbody for ACDF were assessed with multivariable analysis.

RESULTS SECTION:

Of 173,833 isolated one- or two-level ACDF cases identified, structural allograft was used for 63,029 (36.3%) and synthetic cages were used for 110,804 (63.8%). Notably, the use of synthetic cages increased from 51.1% of cases in 2011 to 75.8% of cases in 2021 ($p < 0.0001$) (Figure).

Independent clinical predictors of synthetic cage use were: older age (odds ratio [OR] 1.02 per decade), female sex (OR 1.04), and greater ECI (OR 1.09 per 2-point increase). Independent non-clinical predictors of synthetic cage use were: geographic region (Northeast OR 1.1, South OR 1.85, and West 2.08, each relative to Midwest), and provider specialty (orthopaedic OR 1.06 relative to neurosurgeon).

DISCUSSION:

The usage of synthetic cages in one- and two- level ACDF has increased relative to allograft usage between 2011 and 2021 in the United States. While there were clinical factors associated with the use of one interbody device relative to the other, the greatest factors were non-clinical (geographic region and provider specialty). The study was limited by its retrospective design and administrative nature of the data, but the cross-section of data allowed for overall usage trends and associated factors.

SIGNIFICANCE/CLINICAL RELEVANCE:

For ACDF procedures, synthetic cages have increased in utilization over the years to the point that they represent over three quarters of the one- and two-level cases done in 2021. The fact that non-clinical factors were the greatest drivers associated with this decision, there is clearly room for evolving more consistent and evidence-based recommendations.

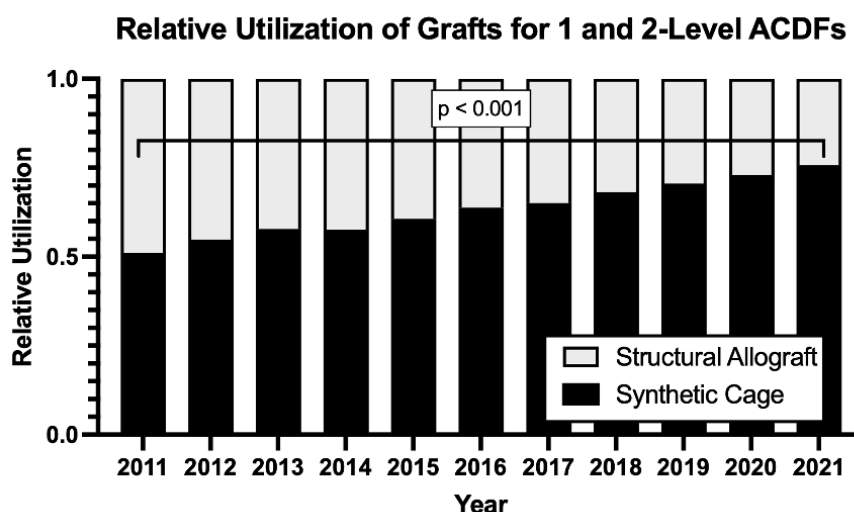


Figure: Trends in the relative utilization of synthetic cages compared to allografts in single and 2-level ACDF procedures