# [Comparison of drug eluting versus bare metal stents for pulmonary vein stenosis in childhood.](https://www.ncbi.nlm.nih.gov/pubmed/31067002)

Khan A, Qureshi AM, Justino H.

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**Take Home Points:**

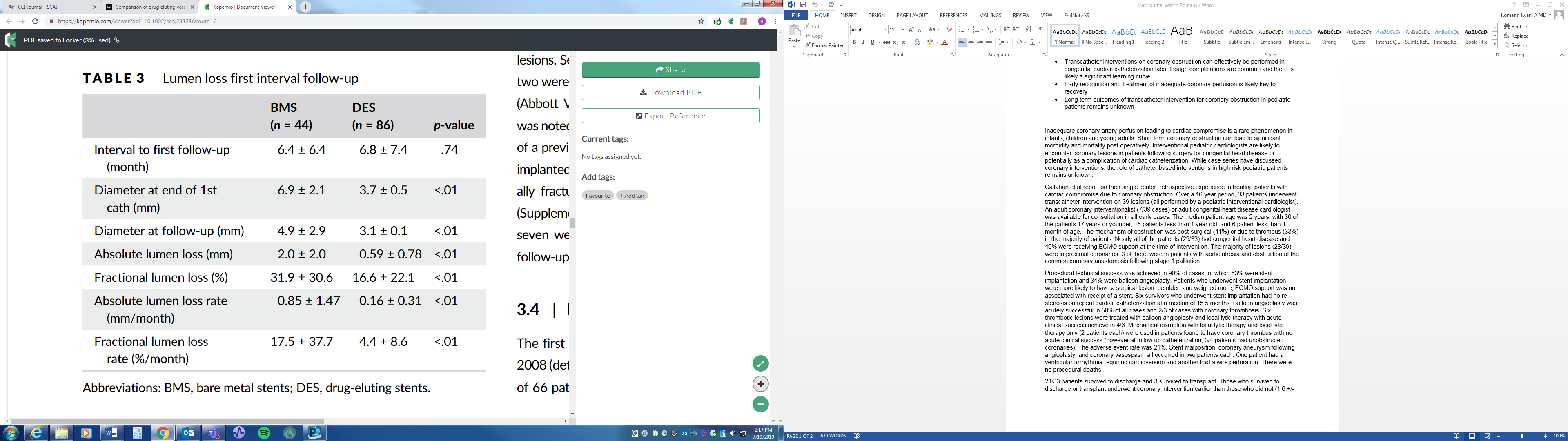
* Pulmonary vein stenosis is a challenging disease process to manage with poor outcomes when treated surgically and with transcatheter therapies.
* Drug eluting stents show promise in treatment of pulmonary vein stenosis with less lumen loss than standard bare metal stents in short term follow up despite being used in higher risk patients.
* Long term results of pulmonary vein stenosis treated with drug eluting stents remains unknown.



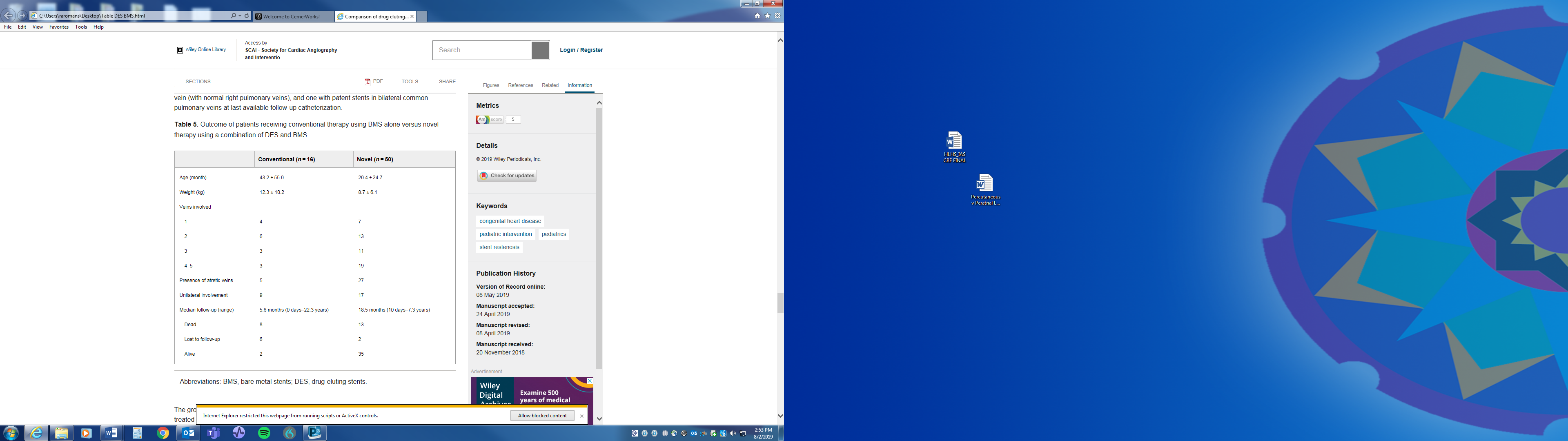
***Commentary from Dr. Ryan Romans (Kansas City, MO), section editor of Interventional Cardiology Journal Watch:*** Pulmonary vein stenosis (PVS) remains a challenging lesion to manage with significant morbidity and mortality despite advances and transcatheter and surgical treatments. Transcatheter intervention with balloon angioplasty, cutting balloon angioplasty and bare-metal stent (BMS) implantation has been shown to be acutely successful but have poor medium and long-term outcomes (large modern era series with 5-year survival of 30-50%), along with high rates of restenosis. Surgical treatment is typically used in patients with ostial lesions and lesions proximal to the first order branching. Again, there is a high rate of restenosis and 5-year survival of approximately 50%. Use of the sutureless technique has improved surgical outcomes. However, lesions beyond the first order division of the pulmonary veins are typically beyond surgeon's reach and hence not amenable to this technique. Additionally, the sutureless technique tends to be more successful in patients with postoperative pulmonary vein stenosis than in primary pulmonary vein stenosis. Given these poor outcomes, drug eluting stents (DES) are being evaluated as a potential strategy to decrease restenosis and potential loss of pulmonary veins.

Khan et al report on their retrospective single center review of all patients who underwent stent implantation for PVS (native and post-surgical) over a 24 year period. A total of 66 patients underwent stent implantation. 37 patients had 58 lesions treated with 62 BMS and 41 patients had 105 lesions treated with 111 DES. 12 patients were treated with both BMS and DES. Patients in the DES group were significantly younger (16.2 +/- 18.8 months versus 2.9 +/- 3.5 years) and smaller (7.4 +/- 3.9 kg versus 11.8 +/- 8.7 kg) than those in the BMS group. Lesion diameter increased from 2.9 +/- 1.7 mm to 7 +/- 2 mm with BMS implantation and 1.3 +/- 1 mm to 3.8 +/- 0.6 mm with DES implantation (significantly more increase with BMS). Mean gradient decreased from 10.7 +/- 6.5 mmHg to 2.1 +/- 2.8 mmHg in the BMS group and 12.6 +/- 6.2 mmHg to 2.8 +/- 2.7 mmHg in the DES group (no statistically significant difference in pre or post gradient between groups).

Follow up cardiac catheterization was performed on 44/58 lesions treated with BMS at an interval of 6.4 +/- 6.4 months and 86/105 lesions treated with DES at an interval of 6.8 +/- 7.4 months. Absolute lumen loss (mm), fractional lumen loss (% lumen diameter change from time of implantation to follow up catheterization), absolute lumen loss rate (mm/month) and fractional lumen loss rate (%/month) were all significantly lower in the DES group as shown in the table below.



Patients were divided into two groups in an attempt to determine era and treatment strategy effect. The conventional group received BMS only throughout their treatment course, with their first stent implantation prior to 2008. The novel group included all remaining patients. In this group, DES were implanted whenever possible (lesion diameter < 4mm as this was the largest DES available) and BMS were implanted only when DES was not possible (lesion >4 mm). The table below shows outcomes for the two groups. The authors note that their center trended to more transcatheter rather than surgical intervention in these patients over time. Patients in the novel therapy group tended to be younger, have more native than post-operative PVS, and have more veins involved. Despite this, 2 year survival was 74.7% in the novel therapy group and 53.1% in the conventional group.



The authors note that the mechanism of PVS appears to be related to myofibroblast proliferation. DES allow for the benefit of local drug delivery to prevent neo-intimal proliferation. They have been shown to decrease in stent stenosis in adults who undergo stent implantation for coronary artery disease. Systemic drug levels from DES have been evaluated in patients who undergo DES implantation in the ductus arteriosus (PDA stenting for ductal dependent pulmonary blood flow). Sirolimus levels were found to be in an immunosuppressive range but there were no serious infectious complications.

Analysis of patient specific outcomes is challenging as there may be a significant era effect (there was not access to DES in earlier patients). However, patients receiving drug eluting stents were younger, smaller, and had more veins involved indicating a much more aggressive disease process. Also, the diameter at first implant was smaller in the DES group than BMS group making the risk of neointimal proliferation higher. Despite these factors, lesions treated with DES had significantly less lumen loss than those with BMS at the first follow up catheterization. The authors conclude that this must be due to the local delivery of the antiproliferative agents. The study is limited by the fact that it does not take into account additional treatment strategies applied to the later (novel) cohort of patients including more aggressive recanalization of atretic veins, aggressive treatment of restoring complete patency during a single procedure, and scheduled follow up catheterization every 6 months to evaluate for in-stent stenosis and disease progression. Longer term outcomes of patients treated with DES remains unknown.