KSN SEOUL, KOREA 2023
April 27(Thu) - 30(Sun), 2023
Coex, Seoul, Korea

Submission No.: KRFP-9146
Session Title: KSN Research Fund Project
Date & Time, Place: April 28 (Fri), 10:40 - 12:40, Room 4

Kidney Disease after COVID19 Vaccination in South Korea: Multicenter Study

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South Korea was one of the countries hit early in the pandemic of the novel coronavirus SARS-CoV-2 (COVID-19), with its first confirmed case being reported on January 20, 2020. Until December 2022, over 29 million cumulative patients, accounting for 56.3% of the total population, have been diagnosed with COVID-19, and the COVID-19 vaccination exceeded 94 million doses in South Korea. Both COVID-19 infection and vaccines can trigger innate and/or adaptive immune response that can activate autoimmune glomerulonephritis. In addition, excessive cytokines and endothelial injury mediate acute kidney injury, which is common extrapulmonary complications of COVID-19. In South Korea, kidney diseases in temporal relationship with COVID-19 vaccination were reported sporadically from single institutions. However, the incidence and characteristics of kidney disease after COVID-19 infection/vaccines is unclear. In this work, we leverage the information from multiple hospitals to comprehensively characterize kidney diseases that followed COVID-19 infection or vaccination in South Korea.
From 5 centers, 23 patients with kidney diseases, of which 18 were post-vaccines and 5 were post-infection, were obtained. After vaccination, IgA nephropathy was most frequent (n = 11, 61.1%), followed by Henoch-Schönlein purpura nephritis (HSP; n = 2, 11.1%), focal segmental glomerulosclerosis (FSGS; n = 1, 5.5%), IgM nephropathy (n = 1, 5.5%), lupus nephritis (n = 1, 5.5%), crescentic glomerulonephritis (n = 1, 5.5%), and tubulointerstitial nephritis (n = 1, 5.5%). The patients had predominantly mRNA-based SPIKEVAX from Moderna Biotech or COMIRNATY from Pfizer-BioNTech (n = 11, 84.6%), while only 2 (15.4%) had adenovirus-based VAXZEVRIA from AstraZeneca. Initially, 18 (100%), 9 (50%), and 4 (22.2 %) patients showed proteinuria, hematuria, and increased serum creatinine, respectively, which occurred 1–50 days after 1st (n = 4, 22.2%), 2nd (n = 8, 44.4%), and 3rd (n = 6, 33.3%) doses. Eight patients received immunosuppressive treatment, while one patient with HSP achieved spontaneous alleviation of proteinuria without treatment.
On the other hand, 5 patients showed temporal association with COVID-19 infection, including IgA nephropathy (n = 1, 20%), minimal change disease (n = 1, 20%), FSGS (n = 1, 20%), thrombotic microangiopathy (n = 1, 20%), and acute tubular injury (ATI; n = 1, 20%). Those with IgA nephropathy and FSGS also showed ATI. Patients presented with proteinuria (n = 5, 100%) and/or with renal insufficiency (n = 4, 80%) 10–35 days after COVID-19 infection. Patients with FSGS and MCD were managed with steroid. Patients responded well to treatment, except for one with IgA nephropathy who had elevated serum creatinine even after angiotensin receptor blocker and sodium-glucose cotransporter inhibitor.
Taken together, this series showed the landscape of kidney diseases after COVID-19 in South Korea. Both vaccination and infection of COVID-19 induced various disorders. Temporal associations between disease onset and COVID-19 vaccination implied a causal relationship, necessitating recognition of COVID-19 events in managing patients. Considering good prognosis of kidney diseases after COVID-19 vaccines in our series, the overwhelming benefits of vaccination outweigh the potential risks.