Flexible Partial Dentures in Nigeria: A Case Series on Clinical Indications, Patient Experience, and Outcomes

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ABSTRACT

Background: Flexible partial dentures, a 50-year-old technology, have been underutilized in Nigeria despite their potential to transform patient care. Compared to conventional removable partial dentures (RPDs) made from polymethyl methacrylate (PMMA) and cast metal, flexible dentures offer improved comfort and durability. Although widely adopted in advanced countries, their use in Nigeria remains limited in the literature.

Objective: To present our initial experience with flexible partial dentures in five patients with diverse clinical needs, and highlight their clinical indications, patient experiences before, and outcomes after treatment.

Case Series: This case series outlines the clinical journeys of seven patients who transitioned from conventional acrylic dentures to flexible partial dentures due to issues such as poor fit, mucosal irritation, frequent fractures, and anatomical challenges. Each patient was carefully evaluated and fitted with customized flexible dentures that significantly improved comfort, fit, and functionality. The diverse cases illustrate how flexible partial dentures adapt to complex oral conditions and patient preferences, highlighting their practical advantages in a Nigerian clinical context

Conclusion: This case series demonstrates the successful use of nylon-based materials in removable partial dentures with outcomes suggesting that flexible dentures offer a viable, patient-friendly alternative to traditional methods, supporting broader clinical application in resource-limited settings.

Keywords: Flexible partial denture; Patient experience; Removable partial denture; Case series

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INTRODUCTION

The introduction of nylon-like materials in the fabrication of dental prostheses marked a significant advancement in dentistry, offering an alternative to traditional metal and pink acrylic materials used in removable partial denture (RPD).[1] This innovation was first introduced by two brothers (Arpad and Tibor Nagy), who engineered the use of similar grades of polyamide materials starting with Valplast and then Flexiplast, followed by others as a result of the continuing interest and need for modification that ensued from their discovery.[2] The development of flexible partial dentures was driven by the need to overcome the limitations of conventional RPDs, including aesthetics, bulk, and mechanical properties.

Patients opt for dentures for various reasons, including physiological and psychological factors, as well as cost considerations. Prosthetic rehabilitation aims to restore function, aesthetics and psychological well-being.[2] Traditionally, polymethylmetacrylate (PMMA) and cast metal RPD were the gold standard, while cast metal was used for the fabrication of denture bases, and clasps were used when facilities for cast metal dentures and skill were unavailable or due to the lower cost of acrylic.[3,4] However, despite the advantages of acrylic, including the fact that it is aesthetically pleasing and with clearly defined processing methods, [5,6] they have limitations as it relates to the bulk of acrylic and may show the metal components of the denture, which may be unpleasing to the patient. Others are poor mechanical properties, difficulty in placement, as well as leaching of monomer and its attendant effects.[7]

The successful use of RPDs relies heavily on patient comfort and satisfaction because if patients are uncomfortable with their RPDs, they may neglect their use due to dissatisfaction. Despite these challenges, they are the preferred choice for tooth replacement in developing countries.[3] However, their widespread use has also highlighted the need to address their limitations, leading to the development of nylon derivative base materials commonly known as flexible dentures, which come in various types, each with their own set of advantages and disadvantages[2,7-9]

The delivery of RPDs presents a challenge for both dentists and patients, as each clinical case has its unique complexities. To ensure optimal outcomes, it is essential to strike a balance between the denture's functional efficiency and biologic integration, which can be difficult to achieve.[10] This requires careful planning, focusing on fundamental principles of diagnosis, design, and clasp selection, [11] as well as consideration of indications, additional applications, and contraindications of flexible dentures.[8,12]

Flexible dentures are a versatile treatment option, suitable for all partially edentulous cases, particularly where undercuts in the ridge can be utilized for retention, and bilateral undercuts are present, thus avoiding the need of pre-prosthetic surgery. Furthermore, their unique physical properties make them ideal for challenging scenarios including paediatric cases, cancerous mouths, cleft palate, microstomia, systemic sclerosis, acrylic allergy and history of repeated denture breakage.

Additionally, flexible dentures offer an affordable and easy alternative to dental implants and fixed partial dentures, making them suitable for individuals in high-risk professions, such as athletes, police, firefighters, or those exposed to physical harm. They have also been applied in the fabrication of various dental devices, including cosmetic gum veneers, Bruxism appliances, orthodontic devices, unilateral space maintainers, obturators, speech therapy appliances, occlusal splints, sleep apnea appliances, anatomical bite restorers, temporary prostheses, implant-retained dentures, and full dentures for patients with bony protuberances or large undercuts.

Flexible dentures are contraindicated in cases with insufficient inter-arch space for teeth placement, as well as prominent residual or flat flabby ridges with limited space for teeth placement and flat flabby ridges with poor soft tissue support that require more rigid prostheses. Also, deep overbites (≥4mm), which can cause anterior teeth to dislodge during excursive movements, are contraindicated.[13] Other contraindications include cases with minimal remaining dentition and undercuts for retention, bilateral free-end distal extensions with knife-edge ridges or lingual tori in the mandible and bilateral free-end distal extensions on the maxilla with extremely atrophied alveolar ridges.

Flexible dentures have the potential to revolutionize patient care for edentulism and dentures, offering improved comfort and longevity compared to conventional removable partial dentures made of PMMA[5] and cast RPDs. This is supported by the

growing adoption of flexible dentures in advanced countries where dentist recognise their benefits in creating better and stronger appliances.[8,14] Although flexible dentures have been available for over 50 years,[15] their use in Nigeria is limited, with scarce literature on the topic[5,16,17]. This case series aims to address this gap by presenting the successful use of flexible partial dentures in seven patients with diverse clinical scenarios. The study highlights the clinical indications, patient experiences, and post-insertion outcomes, demonstrating the potential of flexible dentures to improve patient care for edentulism and dentures.

By offering a more comfortable and long-lasting solution compared to conventional RPDs, flexible dentures can significantly improve patient outcomes.[8,14]

The use of flexible dentures among patients at the National Hospital Abuja, has shown a gradual increase since the first few cases were introduced in 2009, aligning with the growing global trend. This growth is largely attributed to the positive testimonials from patients who have experienced the proven strength and flexibility of the material, which adapts well to the unique natural conditions of each individual's mouth.[8]

CASE SERIES

This report presents the experiences of 7 patients who previously used conventional acrylic PMMA removable partial dentures (RPDs) but transitioned to flexible dentures due to various challenges. The reasons for switching to flexible dentures included frequent fractures of their previous dentures, probably from the plasticity of the material, the ill-fitting nature of the dentures caused by severely tilted abutment teeth, difficulty in inserting and removing their previous dentures, and irritation and chafing of the mucosa (oral tissues). These patients sought a more comfortable, durable, and functional alternative, leading them to choose flexible dentures. Also, all patients seen consented to the fabrication of flexible dentures following examination and discussion of treatment needs. All had non-contributory past medical histories. All risks and benefits were explained to the patient, who then agreed to go with this choice especially since it was explained to be of a less rigid material that is nylon, which conformed to tissues without much difficulty, as did acrylic and cast metal dentures, but more importantly, that it was not breakable.

CASE 1: Complete flexible denture

A 68-year-old long-term complete denture wearer presented with a complaint of repeated fractures of his upper denture. Patient is a well-controlled diabetic patient who gradually lost his teeth due to periodontal disease and was frustrated with the repeated fractures, difficulty in managing his rigid acrylic denture, and the time spent on repairs. He was more or less at his wits' end and sought a lasting solution.

Patient was duly examined, with no abnormality detected extra orally, while a detailed intraoral clinical examination revealed an edentulous mouth with generalized ridge resorption, worse anteriorly than posteriorly, but not with ulcerations. Saliva flow was adequate, as was the inter-occlusal space height. Following discussions on how to alleviate his situation, he was offered the choice of a flexible denture.

Patient subsequently agreed to give it a try, and impressions of the upper and lower arches were taken using medium-bodied silicone impression material. Fabrication of denture was made using a thermoplastic material by the injection mould technique in the dental prosthetic laboratory; finished and delivered for insertion 3 weeks after impression taking. The patient was satisfied with the fit and stability as well as aesthetics post-operative instructions were given, and the patient was scheduled for a post-operative appointment before discharge.

At the recall appointment, the patient was visibly happy with his prostheses and had no complaints whatsoever.

CASE 2: Poor Fit of Acrylic Partial Denture

A 48-year-old female patient presented with a complaint of poor fit and stability of her acrylic partial denture, which she had been wearing for 10 years. She reported difficulty with inserting and removing the denture, primarily due to tissue undercuts and tilted abutment teeth. These anatomical challenges caused frequent discomfort and irritation. As a result, she chose to fabricate and use only the portion of the denture that replaced the missing anterior teeth.

inclusion of the posterior teeth had previously rendered the prostheses significantly more difficult to tolerate, primarily due to increased bulk and instability, which exacerbated discomfort and soft tissue irritation beyond what she could endure.

The patient's dental history revealed a long history of periodontal disease and tooth loss. Intra-oral examination revealed missing 21, 24, 25 and 27 in the upper right, lower right, and lower left quadrants, and teeth 21, 24, 25 and 27 missing in the upper left quadrant. The mucosa corresponding to tooth 21 had a deep depression, indicating resorption from previous denture wear over time, while tooth 26 was slightly mesially tilted into the edentulous space of tooth 25.

Patient was very reluctant to have her mouth fully restored with an acrylic denture so we broached the option of a flexible denture gently to her. After answering many questions and expressing her concerns, she agreed to have a flexible denture. The treatment plan included fabrication and insertion of a flexible partial denture to address the poor fit and stability issues.

The flexible partial denture was fabricated using Dynaplast material and an injection moulding technique in the dental prosthetic laboratory, allowing for rapid insertion within 4 minutes (Figure 1). Patient was then scheduled for collection at which time fit, stability, and patient satisfaction were assessed. Patient was discharged with a follow-up appointment in a week (See Figures 2, 3 and 4 of flexible denture in situ)

At the follow-up appointments, the patient reported significant improvement in the fit and stability of the denture and was satisfied with the outcome. There were no complications or adverse reactions noted, nor were there complaints of the previous denture.

Case 2, Figure 1a: Denture ready for insertion

Case 2 Figure 1b: Denture in situ

Case 2 Figure 1c: lateral view of denture in situ

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Case 2 Figure 1d: Anterior view of denture in situ

CASE 3 Trauma to Implant-Retained Bridge

A 62-year-old male patient presented with a history of trauma to his implant-retained 3-unit fixed-fixed bridge of 2 weeks duration, resulting in loss of the implants and bridge. An interim PMMA RPD was fabricated for him after assessment of his tissues and residual wounds. He wore this for 6 months, but was dissatisfied due to gingival chaffing and poor stability during function. He therefore represented for further management, but insisted he did not want another implant due to financial reasons.

The patient's medical history was non-contributory despite being a controlled hypertensive patient. His dental history revealed a long history of periodontal disease and tooth loss.

The intraoral examination revealed missing 13, 12, and 11, with a slightly inflamed and jagged oral mucosa. The option of a flexible denture was discussed with the patient due to the presence of irregular, jagged tissue and mild inflammation. The treatment plan included fabrication and insertion of a flexible denture to effectively address the patient's concerns and clinical presentation. The flexible denture was fabricated using snap-lastic material through the injection moulding technique in the dental prosthetic laboratory. The denture was inserted three weeks after the impression was taken. Upon delivery, the patient appeared satisfied and expressed amazement at the final result. Follow-up appointments were scheduled to evaluate the fit,

stability, and overall satisfaction. During these follow-up visits, the patient reported marked improvement in comfort and denture stability, expressing high satisfaction with the outcome. He subsequently requested a second flexible denture as a spare, further indicating his approval of the treatment.
A second denture was fabricated and delivered, which the patient received with satisfaction. He has since returned for additional appointments within the department and continues to use both dentures successfully.

CASE 4: Unusable PMMA RPD due to Gingival Chaffing and Bulkiness

A 44-year-old female patient presented with multiple missing posterior teeth and a history of unsuccessful use of a PMMA RPD of 3years duration. She complained of gingival chaffing resulting in soreness when denture is in use, bulkiness, and the obvious foreign object sensation of the denture, making her unwilling to wear it.

Patient's dental history showed patient had suffered from previous periodontitis resulting in loss of most teeth in her mouth, resultant bone loss in addition to attrition of most posterior teeth.

Patient was duly examined and no extra-oral abnormality was detected whilst the intraoral examination revealed missing 17, 16, 15, 14, 12, 11 in the upper right quadrant. The upper left quadrant had all teeth missing, while the lower right quadrant had tooth 41 missing. The lower left quadrant had tooth 31 and 32 missing.

The upper arch showed bone resorption in the upper left quadrant, worse posteriorly. The lower anterior region exhibited marked resorption, particularly in the 31 and 32 quadrant, with tooth 42 mesially tilted into the edentulous space of tooth 41. Teeth 44, 43, and 33 showed marked attrition, worse on teeth 43 and 33.

Patient was then advised on the use of flexible partial dentures because we felt it would be more compatible to her tissues as well as encourage compliance. Merits and demerits of a flexible denture were then explained to patient including risks. Patient agreed to try it and an impression was taken in alginate and sent to the dental prosthetic laboratory for fabrication using duraflex partials catridges – a tissue coloured injectable thermoplastic resin.

Denture was fabricated and delivered and patient was satisfied. A recall appointment for 1 week was given at the time of which patient was found to be absolutely satisfied with the outcome and its use in-situ.

Patient was then discharged and further follow-ups given to patient for 6 months so that if anything was amiss she was to come right back, till date patient has not revisited for complaint or otherwise.

This patient's case highlights some of the challenges of traditional PMMA RPDs, including discomfort, bulkiness, and aesthetic concerns. The patient's specific oral conditions and tooth loss pattern obviously influenced the treatment plan and outcome.

CASE 5: Interim Flexible Denture for Patient with Implant Loss

A 38-year-old female patient presented with a poor-fitting lower anterior-bound saddle denture of 10 years duration, which she was dissatisfied with because, according to her, it was ill-fitting, did not seat in place and was constantly falling out of its position in her mouth. It furthermore made speaking difficult for her, especially as it was in the anterior lower segment of her mouth, as it was loose. She had previously undergone implant placement but lost the implants and was seeking an interim solution until she could repeat the procedure. Patient is a known hypertensive who is well controlled with no other medical issues and not in any pain. The denture was found to be very loose due to poor retention and stability.

An Intraoral examination revealed loss of lower anterior teeth 42, 41, and 31, with attendant irregular tissue loss, uneven knife-edge ridge, and tilted abutments. All other teeth in the mouth were present, and the oral mucosa and tissues were healthy.

The patient was advised on the use of flexible dentures, seeing that it would help in retention and stability of the denture because of the presence of the knife-edge ridge. Risks, merits and demerits were explained to the patient, who agreed to go with our suggestions.

Impressions were taken and sent to the dental prosthetic laboratory for casting and fabrication of a flexible denture using the Duraflex partials by Myerson (a tissue coloured injectable thermoplastic resin) using the injection moulding technique.

The patient was scheduled for a try-in and collection of the prosthesis at 3 weeks post-impression taking, where the intraoral fit was assessed for occlusal balance, overextensions, tightness, aesthetics, and proficiency in inserting and disinserting.
The patient was discharged only when satisfied with the prosthesis and had understood oral instructions, and with a scheduled appointment for a routine check-up in a week.
Follow-up: The patient has used the flexible denture for over 2 years without reporting any dissatisfaction or problems with usage. The patient has continued to attend recall appointments without any issues and has not discussed the need to have her implants redone again.
This case highlights the successful use of a flexible denture as an interim solution for a patient with implant loss, providing a comfortable and aesthetically pleasing outcome.

CASE 6: Flexible Partial Dentures for Bilateral Bounded Posterior Teeth

A 46-year-old male patient presented seeking replacement of missing posterior teeth in the upper left and right quadrants. He had been using acrylic dentures for over 10 years, which caused gingival chaffing and frequent midline fractures during insertion, withdrawal, and function since the denture was across the palate. The patient though middle aged had no contributory medical illness such as diabetes nor hypertension.
It was decided that a flexible denture would obviate in the sense that being flexible, upon insertion and withdrawal, the material would bend or give without deformation seeing it was flexible as well as its complementing properties of being snug fit and easily withdrawn over undercuts et cetera, and the added benefit of its light weightedness and smoothness in comparison with acrylic PMMA dentures. The patient opted for flexible dentures due to the discomfort and trauma associated with his acrylic dentures. A flexible denture was fabricated, and the patient was satisfied with the fit, aesthetics, light weight, and comfort around the mucosa.
After using the flexible denture for 6 months, the patient adjusted to masticating with it, reporting improved comfort compared to the acrylic denture. Although he experienced some initial discomfort during function, there was no associated pain or trauma to the mucosa tissues. The patient appreciated the light weight and ease of insertion and withdrawal, noting that the flexible denture "snaps into place."
The patient was so satisfied with the flexible denture that he later had a spare one fabricated.
This case highlights the successful use of flexible partial dentures in addressing the discomfort and trauma associated with acrylic dentures, providing improved comfort, aesthetics, and functionality. (see Case 6, Figures 1a and 1b).

Case 6 Figure 1a and 1b: upper bounded flexible denture in relation to old acrylic bounded saddle

Case 6 Figure 1c and 1d: Lower bounded saddle in comparison to the old acrylic denture

CASE 7: Flexible Denture for Patient with Missing Molars in All Quadrants

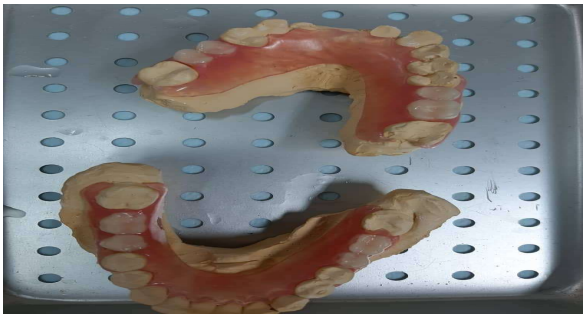
A 56-year-old female patient presented with a complaint of inability to use dentures fabricated about one year ago. Her history was that she had had her first and second molars extracted in all quadrants due to caries. She had previously attempted to use a rigid acrylic denture but was unable to tolerate it due to pressure on the gingiva, chaffing, and trauma during eating. She came in with the dentures in a pouch in her handbag, all dried up.
Examination revealed a healthy middle-aged woman with no contributory systemic or medical illness. There was no extra oral abnormality and oral tissues appeared healthy with minimal plaque and some resorption in all quadrants where the extractions had taken place as well as a reduced saddle space in all quadrants incapable of restoring missing teeth series in the respective arches such that different series of teeth (smaller than lost teeth series) were incooperated in the denture design to compensate for the lost or missing tooth.

The patient was advised on the benefits of a flexible denture. Questions were asked by the patient on the benefits in comparison to the acrylic denture that is being used. She further reiterated that she would not wear it if she had the same experience. Her questions were answered and fears allayed in explaining the risks, merits and demerits of the denture and in her case, the flexibility of the denture, making it a less rigid option together with its lightweighted. Following the impression taking, the denture was fabricated with the Duraflex partials in an injectable thermoplastic resin moulding process in the laboratory with minimal modifications (Case 7 Figure 1a) delivered in 3 weeks for try-in and collection by the patient. At this appointment, patient was impressed with the lightweight, aesthetics, and ease of insertion and removal and fit of the denture but complained about tightness and pressure from the gum on the upper right quadrant.

An examination intraorally with denture in-situ revealed some tissue blanching that inferred excessive pressure from too tight a fit. The denture was taken out and immersed in warm water for about 5 minutes which made it almost malleable at which time it was then reinserted into patient's mouth till she was comfortable and allowed to set in situ. Denture was then taken out, rinsed and given to patient to re-insert herself and intra oral mucosa was observed. There was no blanching and patient was satisfied (Case 7 Figure 1b,1c and 1d), she was then discharged with post-operative instructions and follow-up appointments given.

After using the flexible denture for over a year and a half, the patient reported satisfaction with the fit, aesthetics, and stability. The flexible denture provided a comfortable and functional solution for her missing molars, addressing the issues she experienced with the rigid acrylic denture even though the missing teeth in some instances were replaced with smaller teeth as the space was no longer wide enough to accommodate all missing teeth series.

This case highlights the successful use of flexible dentures in patients with multiple missing teeth, providing improved comfort, aesthetics, and functionality compared to traditional rigid acrylic dentures.



Case 7, Figure 1a: upper and lower bounded flexible dentures on stone model at delivery.

Case 7, Figure 1b: upper bounded flexible denture in situ

Case 7, Figure 1c: Lower bounded flexible in situ.

Case 7, Figure 1d: lateral view posterior bounded saddle of flexible denture

DISCUSSION

The use of removable dentures is a common treatment option for patients with missing teeth.

However, traditional materials used in denture fabrication, such as cast metal and PMMA, have limitations. Cast metal dentures can be uncomfortable and aesthetically unpleasing,[2, 18] while PMMA dentures can be prone to fracture and lack durability, as was evidenced in the case of the patient presenting with repeated fractures of his dentures [19,20]

Discomfort was another feature that was prominently evidenced in the majority of the presented cases, as most of the cases (case 2, 4) suffered from the discomfort of the prostheses in the mouth, the rigidity, thickness resulting in fracture or lack of compliance in wearing of these dentures. Nylon-based materials have been introduced as an alternative to traditional materials in denture fabrication. These materials offer several advantages, including flexibility, thin fabrication, and improved aesthetics.[21,22] The flexibility of nylon-based materials allows for comfortable wear and easy adaptation to the oral environment, making them ideal for patients with sensitive teeth and gums.[13,23]

The cases presented in this series demonstrate the successful use of nylon-based materials in removable dentures for patients with various dental conditions. In each case, the nylon-based denture provided improved aesthetics, functionality, and patient satisfaction. The flexibility and thin fabrication of the material allowed for comfortable wear and easy adaptation to the oral environment. Furthermore, the flexibility afforded the added ease in insertion and removal of these dentures as well as the fact that, where clasps were necessary, these were included with the flexible denture base material as all-in-one rather than inclusion of rigid metal clasps in the denture design. These all-inclusive clasps are made with the same material which is flexible and comfortable to the patients as they slide over teeth contacts and remained snug.

One of the key benefits of nylon-based materials is their ability to be fabricated in thin sections, making them ideal for patients with limited space or sensitive teeth.[13,24] This is corroborated in the light weightiness of the dentures that made the patients happier and eager to convert to the flexible dentures as adaptability was easier, resulting in no bulk, feel of foreign object in the mouth and readiness to wear the dentures. Additionally, the shade guide and translucent options enable seamless blending with the patients' natural gingival colour, providing improved aesthetics.[24]

This is a feat that is not so easy to achieve with the PMMA dentures, such that in the worst case scenario, a translucent shade option can readily be chosen and the patient's tissues are seen through the material.

While limitations and potential drawbacks exist, the benefits of nylon-based materials in denture fabrication outweigh the drawbacks. These materials offer a cost-effective and patient-friendly solution for oral rehabilitation when compared to cast metal and PMMA dentures.[13] This observation applies to both acrylic dentures and more notably, to cast metal dentures. In this case, the flexible denture served as the definitive treatment choice for the patient with a knife-edge anterior ridge, which had previously been considered implant therapy but ultimately opted for the flexible denture, due to its numerous advantages and overall suitability. It is important to note that this does not suggest that flexible dentures are a substitute for implant therapy; rather, in this case, the patient made an informed choice based on individual circumstances and treatment satisfaction.

Further research and long-term follow-up studies are recommended to confirm the durability and clinical performance of nylon-based materials for denture fabrication in our environment.

CONCLUSION:

This case series demonstrates the successful use of nylon-based materials in removable partial dentures for patients with various dental conditions. The cases highlight the versatility and benefits of these materials, including improved aesthetics, functionality, and patient satisfaction. The flexibility and thin fabrication of nylon-based materials allowed for comfortable wear and easy adaptation to the oral environment. Additionally, the shade guide and translucent options enabled seamless blending with the patients' natural gingival colour.

While limitations and potential drawbacks exist, the benefits of nylon-based materials in removable partial dentures outweigh the drawbacks. These materials offer a cost-effective and patient-friendly solution for oral rehabilitation. Further research and long-term follow-up studies are recommended to confirm the durability and performance of nylon-based materials in removable partial dentures.

Overall, this case series supports the use of nylon-based materials as a viable option for removable partial dentures, providing improved outcomes and patient satisfaction.

LIMITATIONS

Some of the cases did not give consent for their photographs to be taken and used for this case series.

Source of Support

Nil

Conflict of interest

None Declared

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